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# FM 8-35

DEPARTMENT OF THE ARMY FIELD MANUAL

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# TRANSPORTATION OF THE SICK AND WOUNDED



DEPARTMENT OF THE ARMY

•

DECEMBER 1955

## FIELD MANUAL

## TRANSPORTATION OF THE SICK AND WOUNDED

CHANGES }  
 No. 2 }

HEADQUARTERS,  
 DEPARTMENT OF THE ARMY  
 WASHINGTON 25, D. C., 5 August 1960

FM 8-35, 19 December 1955, is changed as follows:

**107. Areas of Employment**

a. *Theater of Operations.* Two phases of \* \* \* theater of operations.

- (1) *Within the combat zone.* Aircraft will be \* \* \* situation will permit. Army aircraft will normally evacuate from **battle group or** battalion aid stations to Army medical units in rear of a division such as the **mobile Army surgical hospital (MASH)** or evacuation hospital. Army aircraft available \* \* \* the airhead area.

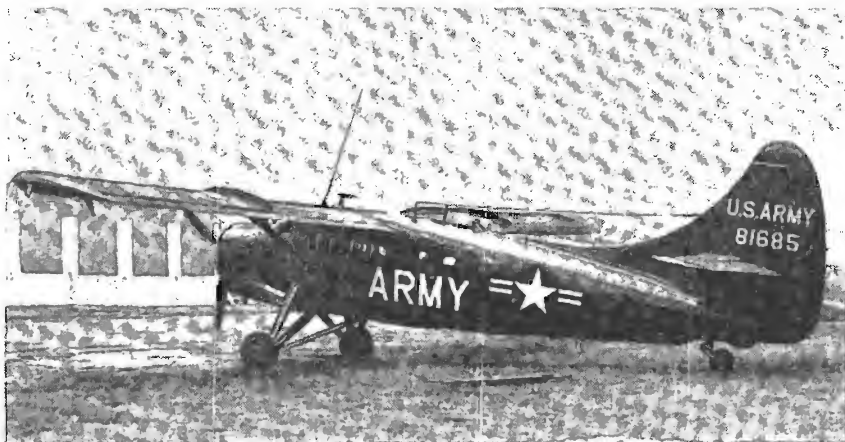
\* \* \* \* \*

**113. (Superseded) General**

The Armed Forces have a variety of aircraft that may be utilized for aeromedical evacuation. The types of aircraft available range from small Army observation aircraft capable of transporting two litter patients, to the heavy Air Force transports that are capable of transporting up to 127 litter patients. All aircraft assigned to the medical services of the Armed Forces will display the red cross and will consequently be protected by the provisions of the Geneva Convention. Aircraft whose primary mission consists of the movement of personnel, supplies, and equipment are not protected by the provisions of the Geneva Convention and are therefore not authorized to display the red cross.

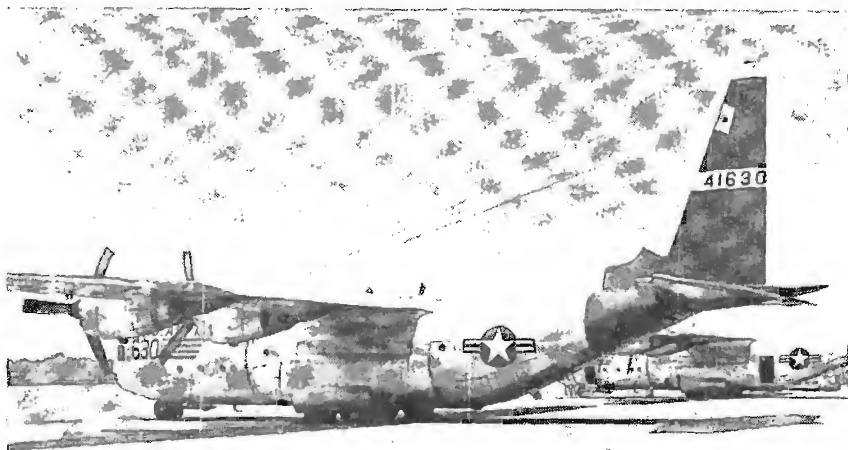
**114. (Superseded) Army and Air Force Aircraft**

The majority of aircraft organic to units of the field army are provided with litter support fittings and may be rapidly modified for use as aerial ambulances (fig. 185). Such aircraft can be employed in forward areas to evacuate from division medical installations. These missions are of an emergency nature and are secondary to the primary mission of the aircraft, which may be reconnaissance or transporting personnel, equipment, and supplies into the combat zone. Air Force transport aircraft such as the C-119 (fig. 183), C-123 (fig. 177), and C-130 (fig. 176.2) are medium



*Figure 176.1 (Added) U-1A "Otter".*

assault transports and are equipped to transport from 35 to 70 litter patients. Their forward loads of personnel, ammunition, etc., can be unloaded and then can be reloaded with patients in a short time. Aeromedical evacuation is a secondary mission of these aircraft.



*Figure 176.2 (Added) C-130, an Air Force transport aircraft.*

## 115. Helicopters

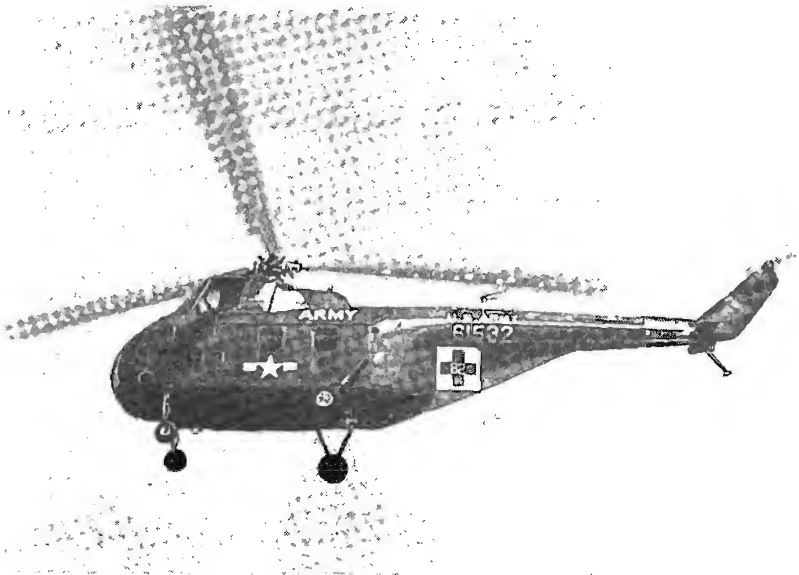
(Superseded) Helicopters are used by all elements of the Armed Forces. They are standard equipment of the Helicopter Ambulance Medical Units of the Army Medical Service, the Transportation Helicopter Company, as well as other units of the division, corps, and Army (① and ②, fig. 178 and fig. 179). The Army Medical

Service uses helicopters to evacuate patients from locations where ground transportation is infeasible. The ability of the helicopter to circumvent fixed defenses and natural obstacles, to deliver medical supplies, to remove patients from otherwise inaccessible areas, and to provide a comfortable, rapid evacuation means for seriously injured patients, increases the efficiency and overall effectiveness of the Army Medical Service.



② (Superseded) H-34 "Choctaw."

*Figure 178. Helicopter ambulance of the Army Medical Service.*



*Figure 179. (Superseded) H-19 "Chickasaw."*



### a. Capabilities and Limitations.

\* \* \* \* \*

- (2) (Superseded) Under normal operating conditions, helicopters are able to carry loads of cargo or passengers (in addition to the pilot, crew, and fuel necessary) for a radius of action of 50 to 70 miles approximately as follows:

	<i>Aircraft</i>	<i>Maximum payload in pounds</i>	<i>Maximum litter capacity</i>
Observation	H-13 "Sioux"	500	2
	H-23 "Raven"	500	2
Utility	H-19 "Chickasaw"	1,200	6
	HU-1 "Iroquois"	2,700	2
Light Transport	H-21 "Shawnee"	2,800	12
	H-34 "Choctaw"	3,200	8
Medium Transport	H-37 "Mojave"	8,000	24
* * * * *			

### b. Selection of Landing Sites.

\* \* \* \* \*

- (3) (Superseded) *Approach zone*. The approach zone of the landing site should be free of obstructions that would preclude the pilot from making full use of the available landing area. The length, width, and height of the approach zone varies with the type site construction and characteristics of the aircraft. For details of helicopter site construction and approach zone requirements, see TM 5-251.
- (4) (Superseded) *Topography*. Preferably, the site should be on slightly elevated ground with sufficient slope to permit good drainage yet not require uphill or downhill takeoffs and landings. The surface must be smooth enough to avoid damage to the aircraft by vibration during the ground run in takeoffs and landings. Units without direct engineer support are greatly restricted in their selection of landing sites by the topographic characteristics that must be considered. (See TM 5-251.)

\* \* \* \* \*

### f. Check List.

\* \* \* \* \*

- (4) (Superseded) Is the site itself large enough to permit the largest type aircraft that can be expected to land, load, and take off safely?

\* \* \* \* \*

## 115.1 (Added) Fixed Wing Aircraft

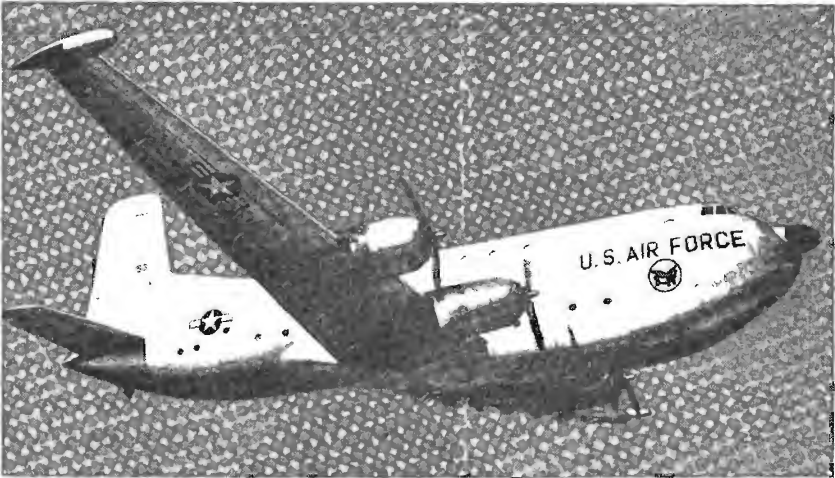
The Army has two fixed wing aircraft, the L-20 "Beaver"

(fig. 176) and the U-1A "Otter" (fig. 176.1), that may be utilized for the evacuation of litter patients when adequate airfields are available and the rapid flight and longer operating range of fixed wing aircraft are desirable. These aircraft, neither of which is organic to TOE medical units, are able to carry loads of cargo and litter patients approximately as follows:

<i>Aircraft</i>	<i>Maximum payload in pounds</i>	<i>Maximum litter capacity</i>
L-20 "Beaver"	1,200	2
U-1A "Otter"	2,000	6

**116. (Superseded) Heavier Transport Planes**

A number of different types of medium transport aircraft are utilized by troop carrier units in transporting patients within theaters of operation. The C-119 (fig. 183) is capable of carrying 35 litter or 62 ambulatory patients. Two other medium transport aircraft currently in use are the C-123 (fig. 177), a two-engine plane capable of carrying 50 litter or 60 ambulatory patients, and the C-130, a four-engine plane capable of carrying 70 litter or 92 ambulatory patients. The C-124 (fig. 184), a four-engine Military Air Transport Service (MATS) aircraft, capable of carrying a maximum of 127 litter or 200 ambulatory patients, may be used for intra- or intertheater troop carrier operations. Other MATS aircraft currently utilized for aeromedical evacuation are the C-118, capable of carrying 60 litter or 76 ambulatory patients, and the C-131, capable of carrying 27 litter or 37 ambulatory patients.



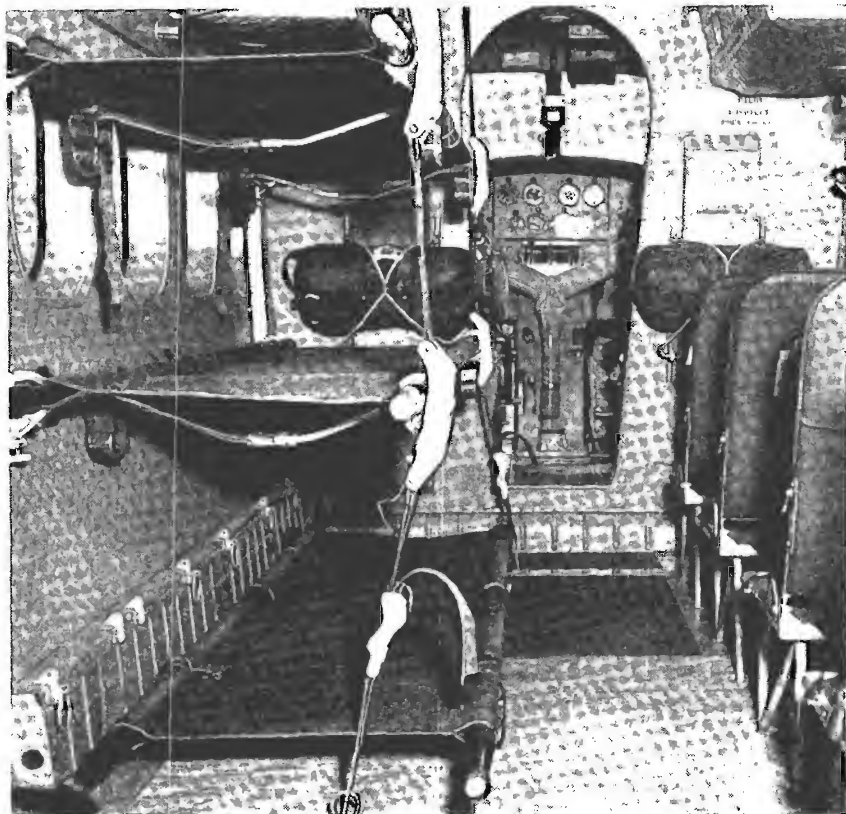
*Figure 184. (Superseded) The C-124, a Military Air Transport Service aircraft.*

## 117. (Superseded) U.S. Air Force Medical Units for Evacuation by Air

An aeromedical evacuation squadron is utilized in conjunction with troop carrier units. Its organization includes a headquarters and four flights. The headquarters consists of an administrative section and an operations section which provide the personnel to operate the Aeromedical Evacuation Control Center. The flights provide the personnel who operate casualty staging facilities, serve as Aeromedical Evacuation Liaison Officers (AELO's) to the using service, provide inflight medical treatment, and supervise the loading and unloading of patients aboard an aircraft. A casualty staging facility can accommodate between 50 and 1,500 patients during a 24-hour period.

## 119. Loading Plan

\* \* \* \* \*



*Figure 185. (Superseded) Interior view of U-1A "Otter," showing the cabin set up to receive three litter and four ambulatory patients.*

b. **Patients** are loaded with their heads toward the front of the aircraft in such aircraft that land in the tail low position such as the L-20 "Beaver" and U-1A "Otter."

\* \* \* \* \*

## 120. (Superseded) Steps in Loading

a. *Fixed Wing Aircraft.* Four men, plus the crew chief, normally load fixed wing aircraft. The crew chief, or other member of the aircraft's crew, supervises the loading of all patients. In large transport aircraft where the loading of many patients is involved, two litter bearers normally remain within the cabin for the placing of patients on litter racks. Thus, usually, two men only are required to remove litters from the ambulances and carry them to the aircraft. With the crew chief supervising and assisting where necessary, the two additional men receive the litter and carry it to its predetermined place within the aircraft. Litters are generally loaded in order from top downward and from the front to the back. At least one of the men handling the litters within the aircraft, in addition to a member of the aircraft's crew, must be familiar with the method by which litters are secured. Figure 185.1 depicts the crew chief of a U-1A "Otter" waiting to receive a litter patient. As described in c(1)(b) below, the No. 2 man of the litter bearer team would normally enter the aircraft to assist the crew chief, or other member of the aircraft's crew in loading the litter.



Figure 185.1 (Added) Crew chief of U-1A "Otter" receives patient from litter bearer section.

*b. Helicopters.*

- (1) *General.* The majority of helicopters utilized by the Army are equipped to transport litter patients on litter support brackets within the fuselage. Except for the H-13 "Sioux" and the H-23 "Raven" which have externally mounted pods, and the HU-1 "Iroquois," those aircraft which transport patients internally follow a similar procedure for loading and unloading patients. For this reason, the description provided in c below of loading procedures for the H-19 "Chickasaw" will be generally similar to the loading procedures for all other Army helicopters which transport patients internally. Separate loading procedures are required for the H-13 and H-23, which transport patients on externally mounted patient evacuation pods, and for the HU-1, which has internally mounted but distinctive litter support brackets. The HU-1 is capable of transporting two litter patients.
- (2) *Loading precautions.* Before detailing the step-by-step procedures for loading, it is best at this point to discuss the precautionary measures to be observed when working in close proximity to rotary wing aircraft. Litter bearers should stay clear of the helicopter—approximately 50 yards—until motioned forward by a member of the aircraft's crew. The helicopter should be approached from the front, at a 45-degree angle to an imaginary line coinciding with the longitudinal axis of the aircraft. Litter bearers should present as low a silhouette as possible so as to avoid injury to themselves and damage to the rotor blades. Single rotor helicopters used for medical evacuation, such as the H-19 "Chickasaw," have an antitorque tail rotor blade. Due to the speed of rotation, these blades are not always readily visible. Accidents have resulted by personnel walking into helicopter tail rotor blades. Extensive damage can also be caused to the main rotor blades, if the litters are raised in a vertical position (fig. 190). Personnel must keep low and clear of the rotors. Loose flying objects, such as parachutes, blankets, and items of clothing should not be left unattended, as they might be blown into the rotor system causing extensive damage to the helicopter. Another safety precaution to be observed is that smoking is not permitted in close proximity to the aircraft. These same precautionary measures will be observed when aircraft are unloaded.

c. *Loading Procedures—the H-19 “Chickasaw.”* The loading procedures for the H-19 “Chickasaw” are similar to the loading procedures for all internally loaded Army helicopters, except the HU-1 “Iroquois.” The H-19 (fig. 179) has facilities for carrying six litters in two tiers of three each, located along the left and right sides of the cabin (fig. 185.2). As illustrated, each of the six litters is supported by its handles in litter support brackets fixed to the sides of the cabin, and by retainer straps suspended from the cabin’s ceiling. These brackets are capable of being adjusted vertically, so that litters may be leveled. A 4-man litter squad is used to load the H-19.

(1) *To load the H-19 “Chickasaw.”*

- (a) The first command is— 1. HELICOPTER, 2. POSTS. At the command POSTS, the members of the litter bearer squad ground the litter at least three paces from the open cabin door of the helicopter, and position themselves about the litter, with the No. 2 man at the foot of the litter, the No. 3 man at the head of the litter, and the Nos. 4 and 1 men to the left and right of

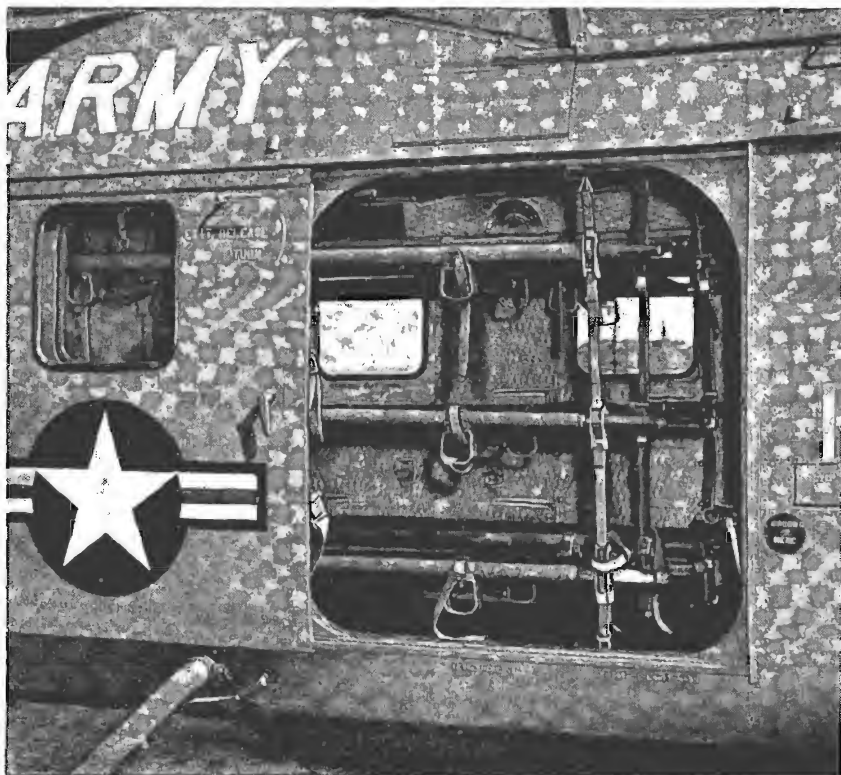
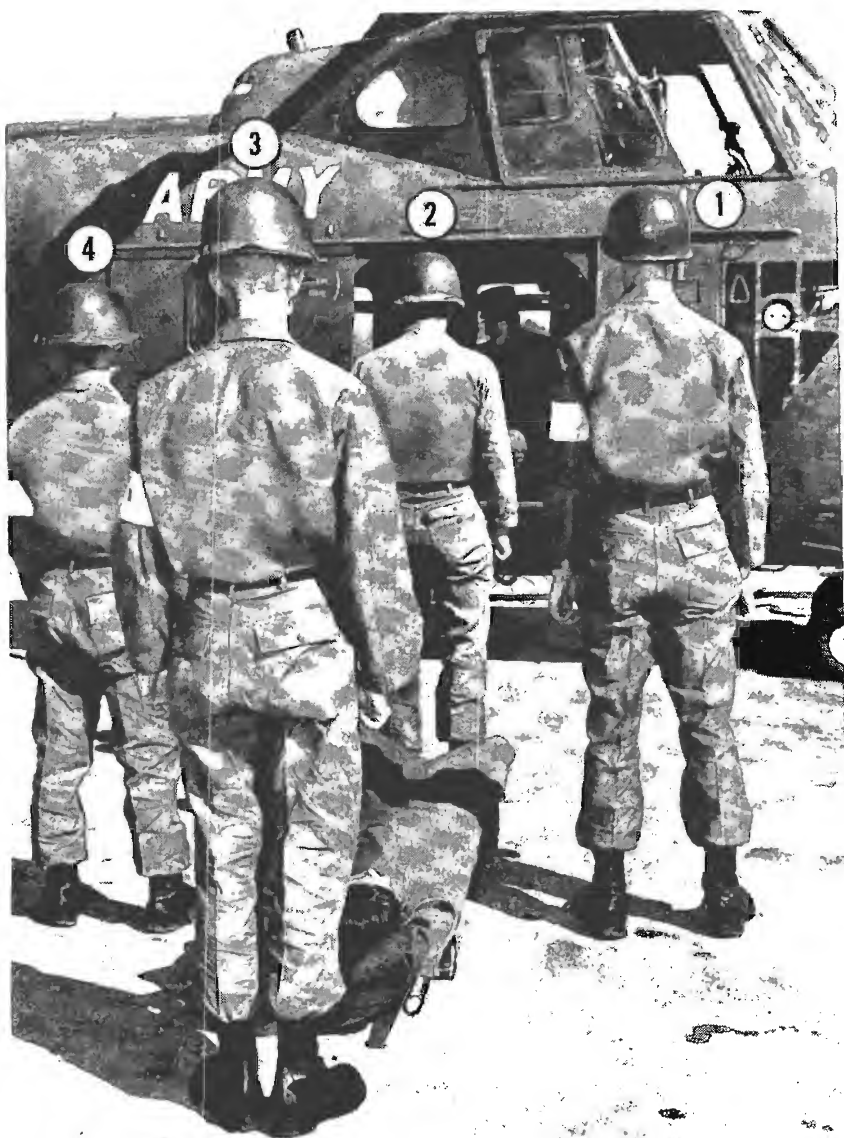


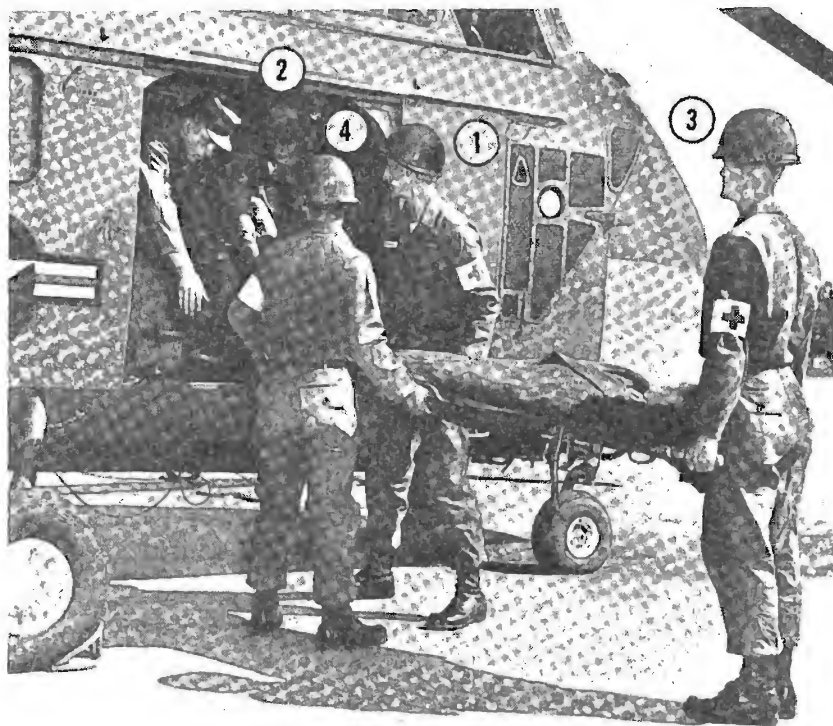
Figure 185.2. (Added) Interior view of the H-19 “Chickasaw.”

the litter, respectively (fig. 185.3). Grounding the litter three paces from the open cabin door gives the crew chief or other responsible personnel an opportunity to check litter support brackets and retainer straps in order to assure that they are in proper position to receive the litters.



*Figure 185.3. (Added) Litter is grounded at least three paces from open door of helicopter (H-19 "Chickasaw").*

- (b) The second command is— 1. PREPARE TO LOAD, 2. LOAD. At the command LOAD, the litter is raised and transported to the helicopter. At the door, the No. 2 man releases the handles of the foot end of the litter to the Nos. 4 and 1 men, and then joins the crew chief or crew member within the helicopter (fig. 185.4). The Nos. 1, 3, and 4 men then deliver the litter to the crew chief or crew member and the No. 2 man who, in turn, place the litter on the appropriate support brackets within the helicopter (fig. 185.5). Patient's head is toward the front of the helicopter. Additional patients are loaded in the same manner, loading the helicopter from top to bottom, left wall first and then the right wall. Where the loading of more than one patient is involved, the No. 2 man normally remains within the helicopter to assist the crew chief or crew member in loading patients. Nos. 1, 3, and 4 men remove patients from surface ambulances and transport them to the helicopter.



*Figure 185.4. (Added) Nos. 4 and 1 men grasp handles of foot end of litter. No. 2 man joins crew chief within helicopter to receive litter. (H-19 "Chickasaw").*



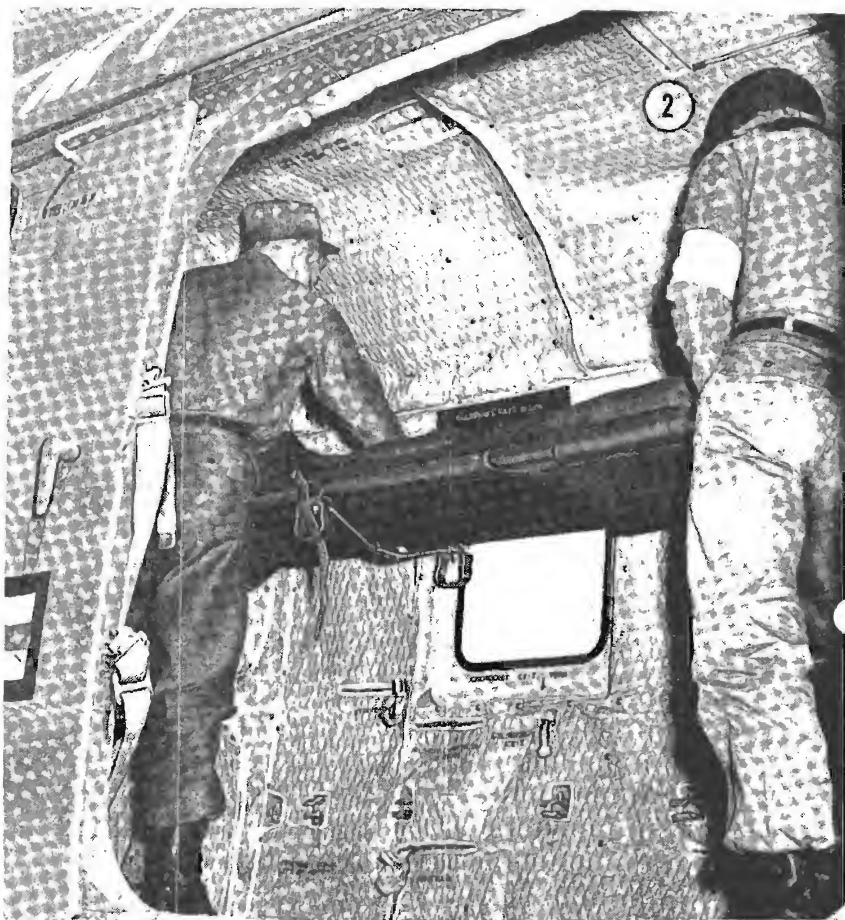


Figure 185.5. (Added) No. 2 man assists crew chief in loading patient onto litter supports of upper left cabin wall of helicopter (H-19 "Chickasaw").

(2) To unload the H-19 "Chickasaw."

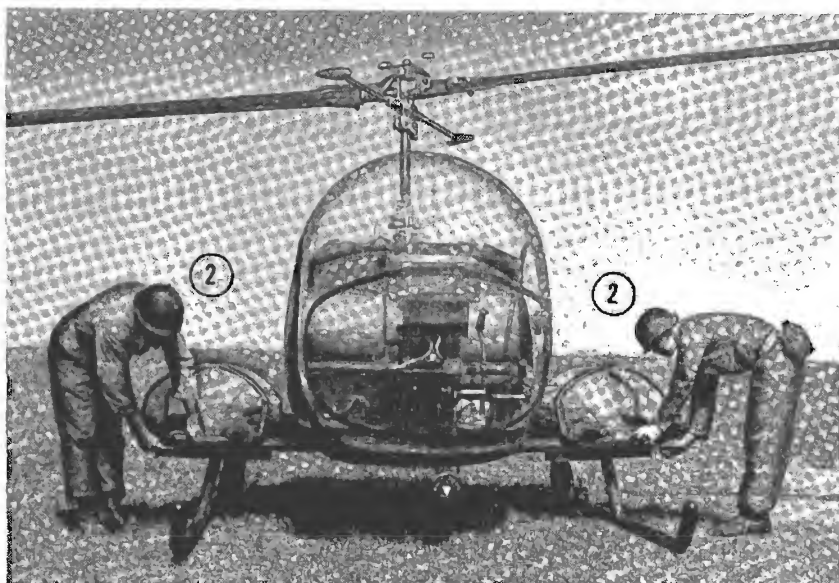
- (a) To unload patients from the H-19 "Chickasaw" the reverse of the loading procedure is followed. The first command is— 1. HELICOPTER, 2. POSTS. At the command POSTS, the squad falls in facing the helicopter and three paces from the open door.
- (b) The second command is—1. PREPARE TO UNLOAD, 2. UNLOAD. At the command UNLOAD, the No. 2 man joins the crew chief or crew member within the cabin of the helicopter and assists in unbuckling patient securing straps and loosening litter retaining straps. The Nos. 1 and 3 men take their positions beside the open cabin door. The No. 4 man takes his position two

paces in front of the open cabin door. The No. 2 man and the crew chief or crew member raise the litter from its support brackets and transport it to the open door of the helicopter. Nos. 1, 3, and 4 men receive the litter and transport it to the appropriate surface ambulance or medical receiving facility. Additional patients are unloaded in the same manner, right tier of litters, bottom up, and then left tier of litters, bottom up.

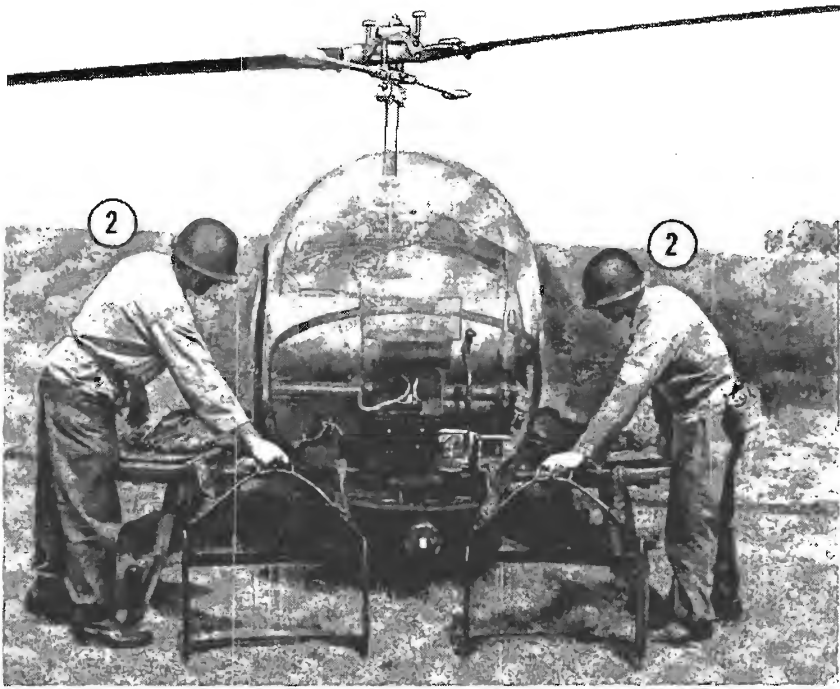
*d. Loading Procedures—the H-13 "Sioux."* In order to illustrate the correct loading and unloading procedures for this type of aircraft, two 3-man litter squads will be used. The heavier of the two patients will always be loaded on the right pod. If only one patient is to be transported, he will be transported on the right pod.

(1) *To load the H-13 "Sioux."*

- (a) The first command is— 1. HELICOPTER, 2. POSTS. At the command POSTS, the members of the two litter squads ground the litters three paces from the right and left pods, respectively. The heads of the litters are proximate to the pods. Nos 1 and 3 men stand beside the head end of the litters, and the Nos. 2 men are at the foot end of the litters.
- (b) The second command is— 1. PREPARE HELICOPTER FOR, 2. LOADING. At the command LOADING, the mem-



*Figure 186. (Superseded) Removing patient protecting canopy securing pins (H-13 "Sioux").*

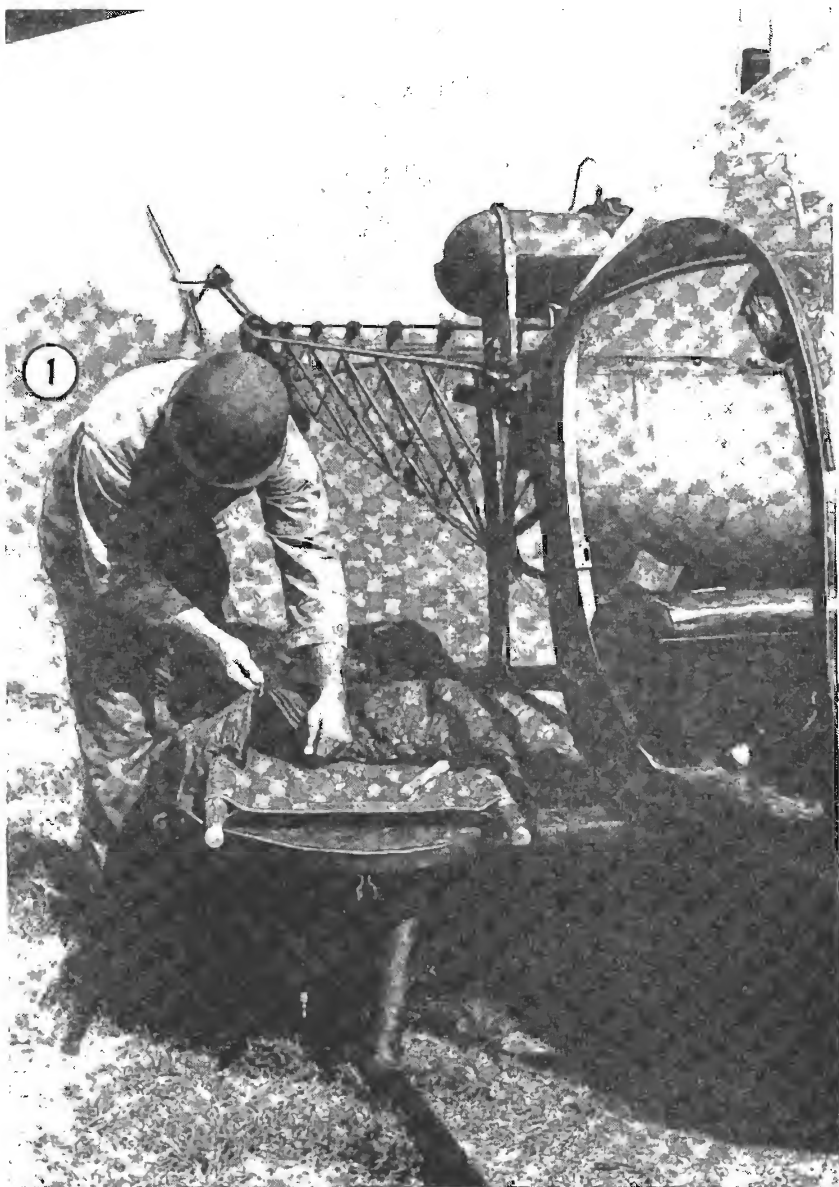


*Figure 187. (Superseded) Patient protecting canopies removed (H-13 "Sioux").*

bers of the squads fall out from their positions. The Nos. 2 men of each squad remove the patient protecting canopy securing pins from the respective pods of the helicopter (fig. 186), and then remove and place the canopies, handles up, in front of the helicopter (fig. 187). The Nos. 1 men of each squad unfasten slide fasteners of the waterproof covers of the respective pods, folding them out of the way (fig. 188). If property exchange, litters, blankets, and splints are aboard the helicopter, they are removed and carried well away from the helicopter by the Nos. 3 men, being careful that long objects such as litters are carried parallel to the ground to avoid the danger of striking the rotating blades (figs. 189 and 190).

- (c) The third command is—1. RIGHT AND LEFT PODS, PREPARE TO LOAD, 2. LOAD. At the command LOAD, the litter squads transport the patients to their respective pods. The litters are placed on the evacuation pods, so that the heads of the patients are to the front of the helicopter. The Nos. 1 men of each team strap the patients securely onto the respective pods with the

patient securing straps and cover the patients by closing the slide fasteners of the waterproof protecting covers (fig. 191). The Nos. 2 men attach the patient protecting canopies to the respective pods (fig. 192). Both ascertain that the securing pins are properly engaged. The pilot or copilot of the aircraft will, when-

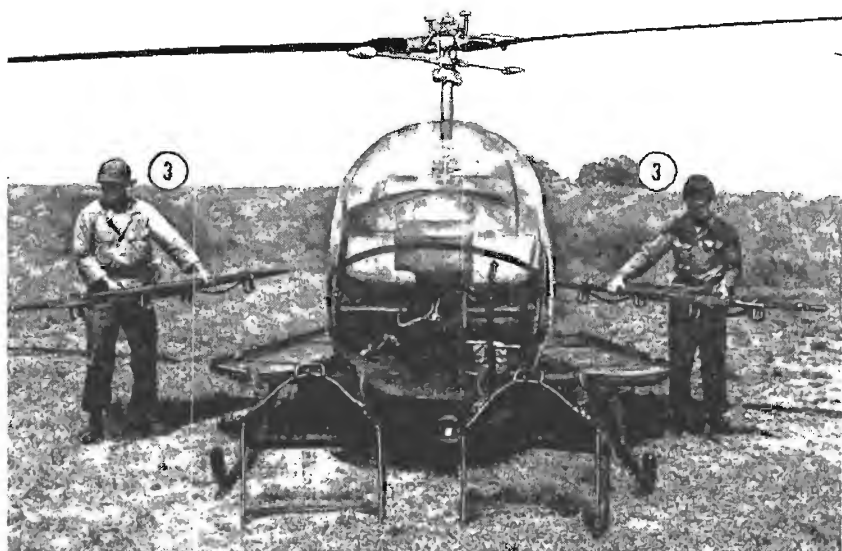


*Figure 188. (Superseded) Unfastening patient waterproof cover (H-13 "Sioux").*

ever time permits, supervise loading of litter patients and ascertain that all items are properly secured.

(2) *To unload the H-13 "Sioux."*

- (a) To unload patients from the H-13 "Sioux", the reverse of the loading procedure is followed. The first command is—1. HELICOPTER, 2. POSTS. At the command POSTS, the two litter squads fall in, positioning themselves from left to right three paces in front of their respective pods.
- (b) The second command is—1. PREPARE HELICOPTER FOR, 2. UNLOADING. At the command UNLOADING, the members of the squads fall out from their positions in front of the helicopter pods. The Nos. 2 men of each squad disengage the securing pins from the patient protecting canopies, and place the canopies, handles up, in front of the helicopter. The Nos. 1 men of each squad unfasten slide fasteners of the waterproof covers of the respective pods, folding them out of the way and clear from the litters. The Nos. 1 men also unbuckle the patient securing straps from their respective patients.



*Figure 189. (Superseded) Correct method of removing property exchange litters from helicopters (H-13 "Sioux").*

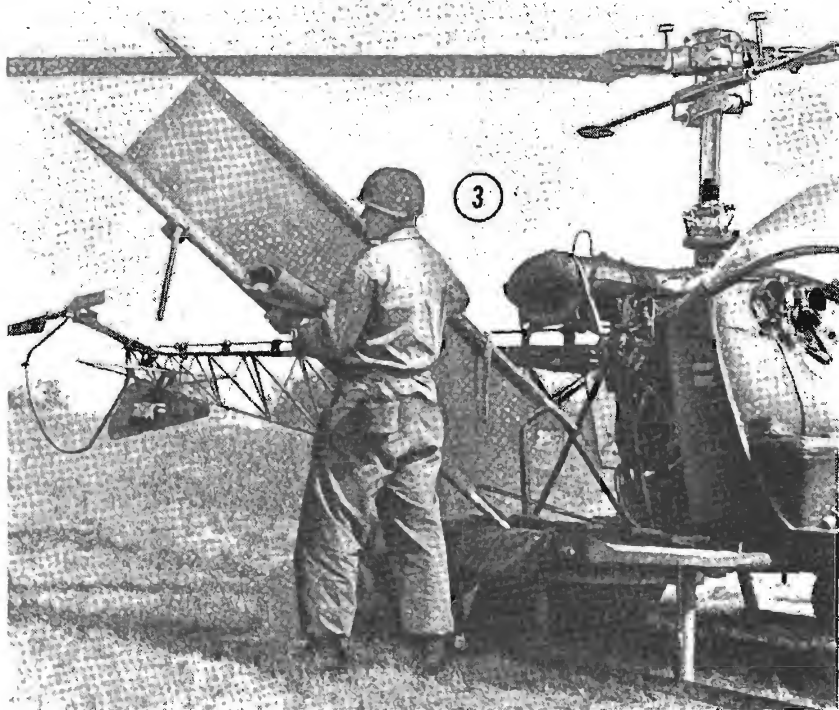
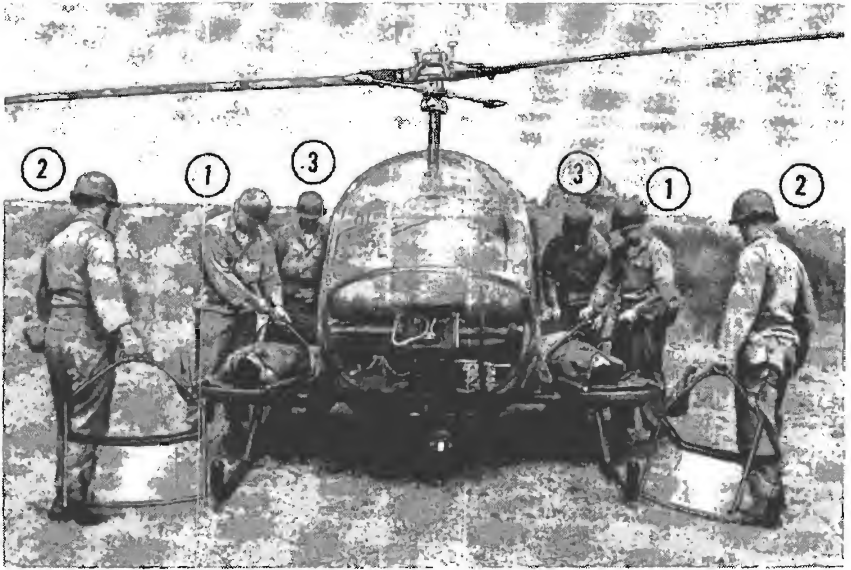


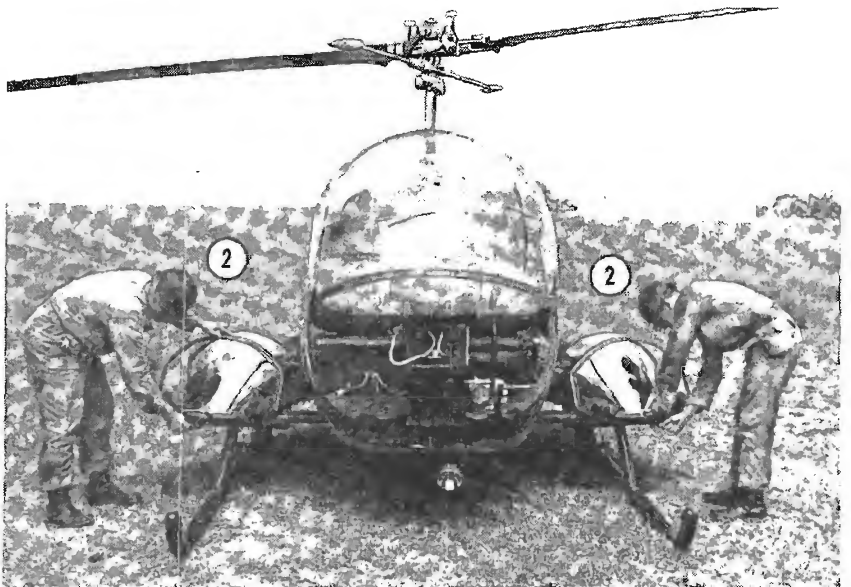
Figure 190. (Superseded) Danger of damaging helicopter rotors by incorrect handling of equipment (H-13 "Sioux").

- (c) The third command is—1. RIGHT AND LEFT PODS, PREPARE TO UNLOAD, 2. UNLOAD. At the preparatory command, the Nos. 1 and 3 men of each squad grasp the litter handles of the head end of their respective litters; the Nos. 2 men grasp the litter handles of the foot end of their respective litters. At the command UNLOAD, the squads raise the litters out of the pods and transport them to a waiting surface ambulance or medical receiving facility.

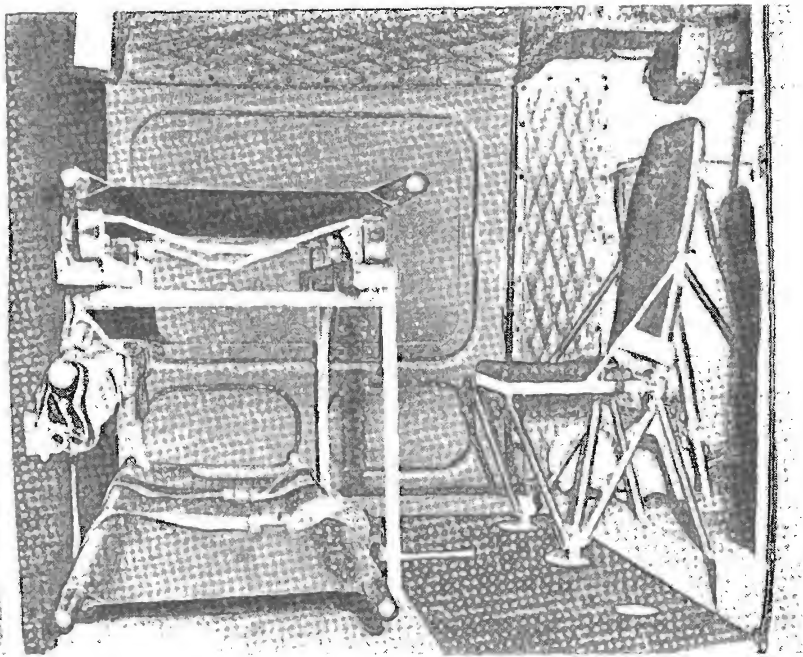
*e. Loading Procedures—the HU-1 "Iroquois".* The HU-1 "Iroquois" is provided with a folding rack designed to accommodate a standard litter as well as to permit the loading of a second standard litter on the cabin floor. Two of the passenger safety belts are used to secure each of the litter patients. The rack may be folded in order to make room for four ambulatory patients. A medical attendant's seat is provided facing the litter rack (fig. 192.1).



*Figure 191. (Superseded) Securing patient in patient evacuation pod (H-13 "Sioux").*



*Figure 192. (Superseded) Attaching patient protecting canopy (H-13 "Sioux").*



*Figure 192.1 (Added) Medical attendant's seat faces litter rack of the HU-1 "Iroquois".*

(1) *To load the HU-1 "Iroquois."*

- (a) The first command is—1. HELICOPTER, 2. POSTS. At the command POSTS, the squad members ground the litter three paces from the open door of the helicopter. The head of the litter is proximate to the open door. Nos. 1 and 3 men position themselves at the right and left of the head of the litter, respectively, and the No. 2 man at the foot end of the litter (fig. 192.2).
- (b) The second command is—1. PREPARE TO LOAD, 2. LOAD. At the command LOAD, the litter is raised and transported to the open door of the helicopter. The Nos. 1 and 3 men place the stirrups of the front of the litter into the grooves of the upper berth of the helicopter litter rack (fig. 192.3). With the litter thus supported, the No. 1 man enters the cabin of the aircraft. The Nos. 2 and 3 men slide the litter into the berth, assisted by the No. 1 man who helps guide and secure the litter into its slots. The No. 1 man also secures the patient on the litter by means of the passenger safety straps. The second litter is loaded into the second berth in the same



manner, the No. 1 man again guiding the litter into place within the cabin and securing the patient on the litter (fig. 192.4).

(2) *To unload the HU-1 "Iroquois".*

- (a) To unload patients from the HU-1 "Iroquois", the reverse of the loading procedure is followed. The first command is—1. HELICOPTER, 2. POSTS. At the command POSTS, the squad members position themselves, so that the Nos. 2 and 3 men are at the right and left of the open door of the helicopter, while the No. 1 man enters the cabin of the aircraft.
- (b) The second command is—1. PREPARE TO UNLOAD, 2. UNLOAD. At the command UNLOAD, the No. 1 man unbuckles the patient securing straps and loosens the litter retaining straps of the litter in the lower berth of the helicopter cabin. The No. 2 man grasps the litter handles of the foot end of the litter, and with the assistance of the No. 3 man pulls the litter

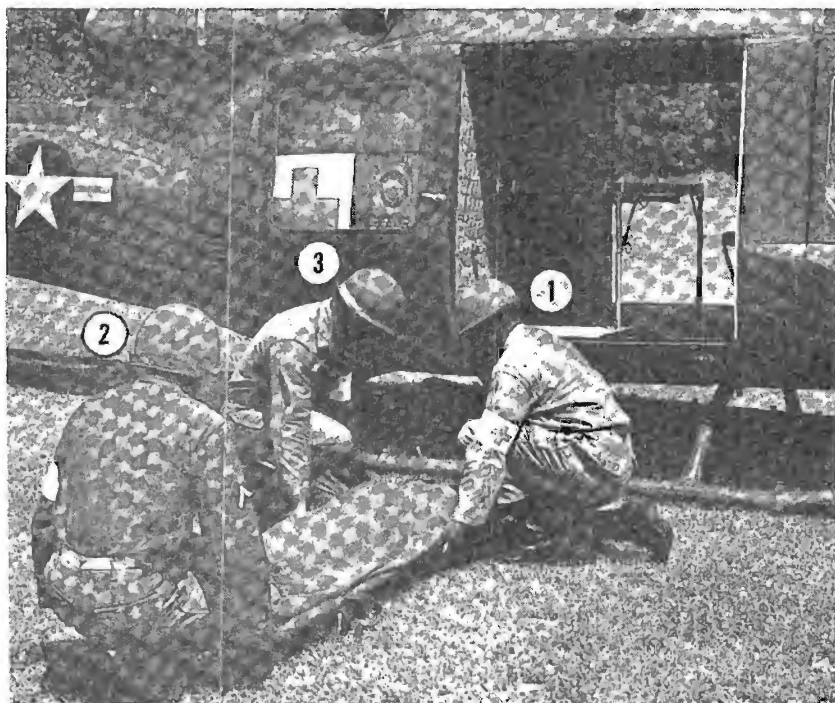
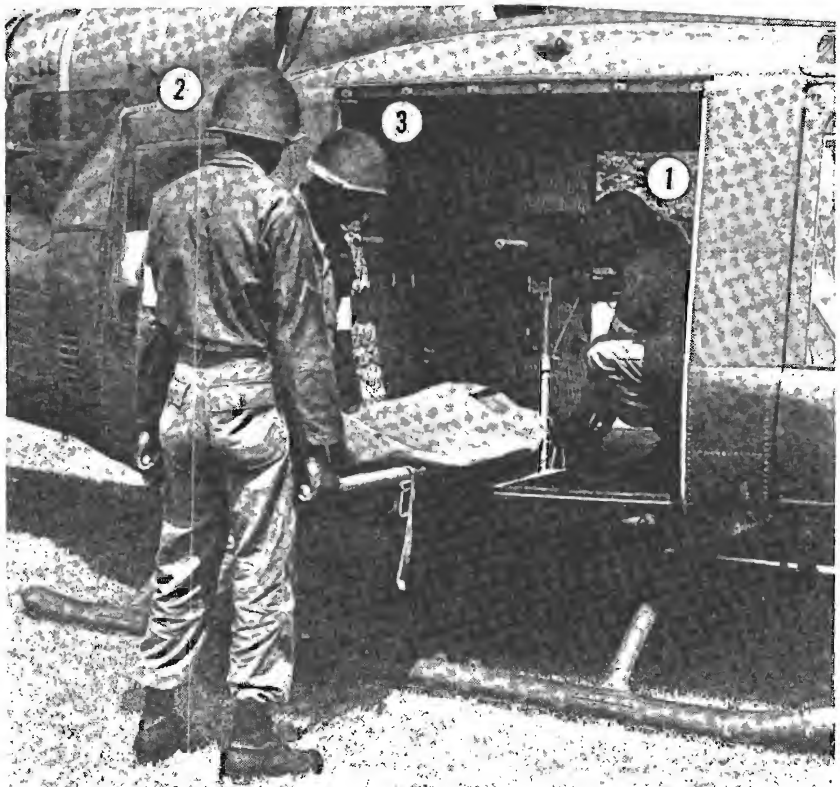


Figure 192.2. (Added) *Litter squad in positions indicated to load upper berth of HU-1 "Iroquois".*



*Figure 192.3. (Added) Nos. 1 and 3 men place front stirrups of litter into grooves of upper berth of HU-1 "Iroquois".*

from its berth. Prior to the time the stirrups of the head of the litter reach the end of the grooved tracks, the No. 1 man halts the other two bearers in place, dismounts from the helicopter and assists the No. 3 man at the head of the litter. The three litter bearers then raise the litter from its berth and transport it to the appropriate surface ambulance or medical receiving facility. The second patient in the upper berth is unloaded in the same manner.



*Figure 192.4. (Added) Lower berth litter is loaded similarly to litter in upper berth of HU-1 "Iroquois". No. 1 man guides and secures litter and patient.*

By Order of *Wilber M. Brucker*, Secretary of the Army:

**L. L. LEMNITZER,**  
*General, United States Army,*  
*Chief of Staff.*

Official:

**R. V. LEE,**  
*Major General, United States Army,*  
*The Adjutant General.*

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*NG & USAR:* Same as Active Army except allowance is one copy to each unit.

For explanation of abbreviations used, see AR 320-50.

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FIELD MANUAL  
TRANSPORTATION OF THE SICK AND WOUNDED

CHANGES }  
No. 1 }

HEADQUARTERS,  
DEPARTMENT OF THE ARMY  
WASHINGTON 25, D. C., 29 September 1958

FM 8-35, 19 December 1955, is changed as follows:

19. Two-Hand Carry

(figs. 30 and 31)

(Superseded)

If the casualty is unconscious, the two-hand carry may be used; however, it should never be used if it is suspected that the casualty has a fractured spine or pelvis.

*a. First Step.* With the casualty lying on his back, the bearers kneel on opposite sides of the casualty's hips.

*b. Second Step.* Each bearer passes his arms under the casualty—one arm under the thighs and the other under the arms and behind the back—and then grasps the other bearer's wrists.

*c. Third Step.* The bearers rise together, lifting the casualty.

*Figure 30* (caption). Add after "Two-hand carry": Position of arms under casualty's arms and back.

*Figure 31* (caption). Change to read: **Two-hand carry, front view.**

38. To Open Litter

(Superseded)

Being at the carry, litter strapped, to open litter, the commands are: 1. Open, 2. LITTER.

*a. First Step* (fig. 58). At the command LITTER, all bearers face the litter, with Nos. 2 and 3 men holding the litter at each end.

*b. Second Step* (fig. 59). Nos. 2 and 3 men will support the litter on each end. Nos. 1 and 4 men will unfasten straps.

*c. Third Step* (fig. 60). Nos. 2 and 3 men will then extend the litter by pulling the handles apart, canvas up. No. 2 man will then lower his end of litter to the ground.



Figure 59. (Superseded) Nos. 2 and 3 men support the litter, while Nos. 1 and 4 men unfasten straps.

d. *Fourth Step* (fig. 61). No. 3 man will raise his end of the litter, until litter is standing vertical. He will then extend the spreader bars by pushing it with foot, reverse the litter, and extend the second spreader bar in the same manner.

e. *Fifth Step*. No. 3 man will lower the litter to the ground, canvas up. All men return to their positions at litter posts.

### 39. To Close Litter

(Superseded)

Being open, to close litter, the commands are: 1. Close, 2. LITTER. At the preparatory command, No. 2 man does an "about face", and faces inward. At the command of execution, Nos. 2 and 3 men will stoop, raise the litter by the left handles, allowing the litter to rest on its right pole, and with their feet only, they will collapse the spreader bars. After the litter has been collapsed, they will bring both poles together and raise the litter with the stirrups pointed upward, allowing the canvas to hang free below the poles. They will then shake off all debris, and turn the litter right side up.

### 40. To Strap Litter

\* \* \* \* \*



*Figure 60. (Superseded) No. 2 man lowers his end of litter to the ground.*

*a. (Superseded) First Step (fig. 62).* At the command of execution men Nos. 1 and 4 face the litter. No. 4 man supports the litter at the center.

\* \* \* \* \*

#### 47. General Rules for Moving Casualties

\* \* \* \* \*

*f. (Added) Skull and Brain Injuries.* Transport in a horizontal position. Do not use head-down shock position.

*g. (Added) Unconscious.* Transport on abdomen with head





*Figure 61. (Superseded) No. 3 man extends spreader bars by exerting pressure with his foot.*

turned slightly to one side to facilitate drainage of vomitus, saliva, and blood, to prevent their aspiration.

*h. (Added) Jaw Wounds.* If classified as a litter patient, transport on abdomen with head turned slightly to one side.

*i. (Added) Open or Sucking Wound of the Chest.* Transport on litter with chest and head elevated with casualty lying on injured side.

*j. (Added) Cold Injuries.* All cold injuries involving the lower extremities should be evacuated by litter.

*k. (Added) Back Injuries.* See paragraph 51.

## 51. To Load and Unload Casualties With Back Injuries

\* \* \* \* \*

*a.* The No. 1 man \* \* \* arch of the casualty's back. To lift the casualty on the litter, the No. 3 man places **one hand under the casualty's head and the other under his shoulders**; the No. 4 man places his hands under the small of the back and buttocks; and the No. 2 man places his hands under the thighs and calves; No. 1 man assists the No. 4 man at the small of the casualty's back. All men kneel on the knee nearest the casualty's feet.

*b.* At the command Lift, PATIENT, all men gently lift the casualty off the ground about 8 inches, **making sure that proper body alinement of the casualty is maintained**. The No. 1 man \* \* \* on the litter.

## 60. To Pass Major Obstacles

*a.* To pass over fences, ditches, and similar obstacles, men Nos. 1 and 4 close in and grasp **the adjacent poles to the rear of No. 2 man**. No. 2 man then \* \* \* across the obstacle. Having passed the obstacle, men Nos. 1 and 4 **grasp the adjacent poles forward of the No. 3 man**. No. 3 man then \* \* \* to their posts.

\* \* \* \* \*

## 86. Ambulance Personnel, Equipment, and Duties

(Superseded)

*a.* An ambulance crew consists of an ambulance driver and an ambulance orderly. Each of these men must be qualified in basic emergency medical care and treatment procedures. All ambulances normally are supplied with litters, blankets, and splint sets.

*b. Duties.*

(1) *Driver.* The driver is responsible for the vehicle at all times. He performs driver maintenance and is responsible for reporting major defects to his section chief or to the unit transportation sergeant. He is also responsible for—

(*a*) Maintaining the proper number of litters, blankets, and splints within his ambulance.

(*b*) Property exchange upon the loading and unloading of patients.

(*c*) Preparing the ambulance for loading and unloading and thereafter for departure.

(*d*) Assisting the litter bearers in the loading and unloading of patients.

(*e*) Safety and welfare of all patients entrusted to his care.

- (f) Delivery of messages and medical supplies upon request of authorized personnel.
  - (g) Performing the duties of the ambulance orderly when no orderly is assigned.
- (2) *Ambulance orderly.* The ambulance orderly acts as assistant driver when required and will perform the following duties:
- (a) Familiarize himself with the condition of each patient being transported.
  - (b) Check with the person in charge of evacuation for any special instructions in the care and treatment of patients while en route.
  - (c) Supervise and assist in the loading of patients, making sure that patients with wounds of the chest or abdomen or those who are wearing cumbersome splints are loaded in the lower berths.
  - (d) Render emergency medical treatment as required by the patients en route.
  - (e) Make periodic checks of patients while en route.

#### 87. Types of Ambulances

\* \* \* \* \*

a. *Field Ambulances.* These ambulances are \*\*\* to do so.

\* \* \* \* \*

#### (2) *Truck, 1/4-ton, 4x4*

- (a) (Superseded) *Truck, ambulance, front-line.* The forward area ambulance is specifically designed to combine the maneuverability of the ordinary 1/4-ton truck with some of the advantages of a closed ambulance. This ambulance normally is used to evacuate casualties from the front line unit to the aid station. It has berths for three litter cases or two litter cases and three ambulatory cases (figs. 126.1 and 126.2).

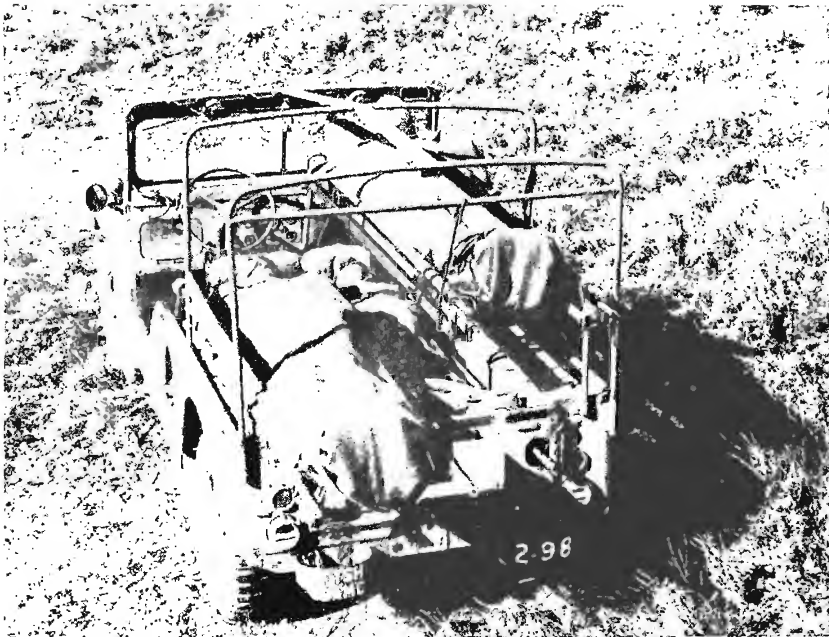
(b) *Converted 1/4-ton truck.* (Rescinded)

\* \* \* \* \*

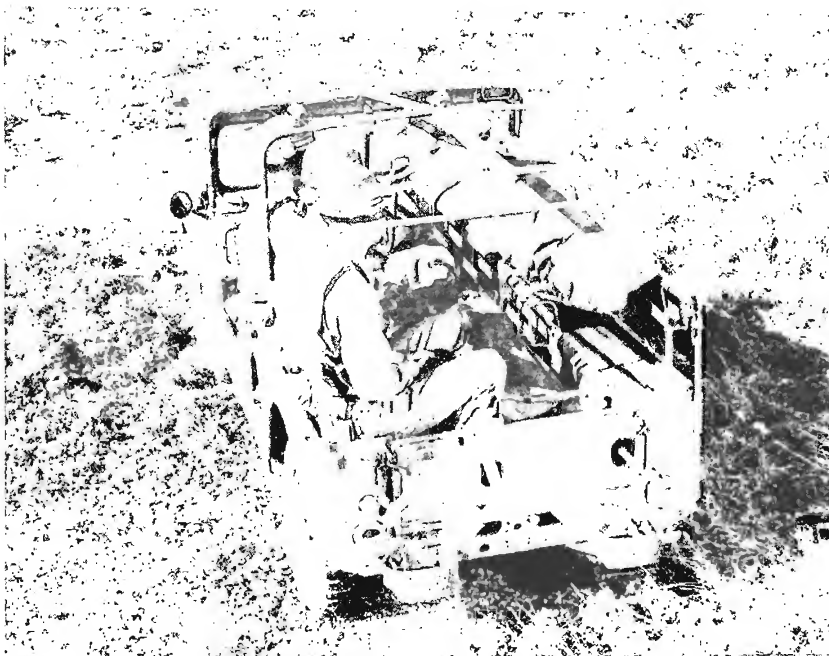
#### 89. General Rules

a. (Superseded) *Berths and Order of Loading.* The four longitudinal spaces formed within the truck, 3/4-ton, 4x4, ambulance M43, are known as berths and are designated right (left) upper (lower). The berths of the truck, ambulance, front-line, 1/4-ton, 4x4, M-170, are designated right upper (lower) and left berths, respectively.

\* \* \* \* \*



*Figure 126.1. (Added) Truck, ambulance, front-line, loaded with three litter patients.*



*Figure 126.2. (Added) Truck, ambulance, front-line, loaded with two litter and three sitting patients.*

(Added)

a. *General.* A three man squad is required to load or unload the front-line ambulance.

b. *To Load the Ambulance.*

- (1) The first command is: 1. Ambulance, 2. POSTS. At the command POSTS, the members of the squad fall in, alining themselves in numerical sequence from left to right, one pace in the rear of and facing the vehicle (fig. 151.1).
- (2) The second command is: 1. Prepare Ambulance For, 2. LOADING. At this command, bearers take positions as follows: Nos. 1 and 3 men at left and right sides of ambulance, respectively, and No. 2 man at the rear. Bearers furl curtains at assigned positions. No. 1 man then lowers the tailgate (fig. 151.2), enters the ambulance, and arranges the front passenger seat in crash pad position for upper and lower litter patients. No. 2 man unties litter rack storage strap, located on the right outside bow (fig. 151.3). No. 3 man, assisted by the No. 1 man, sets up the upper litter rack (fig. 151.4). The

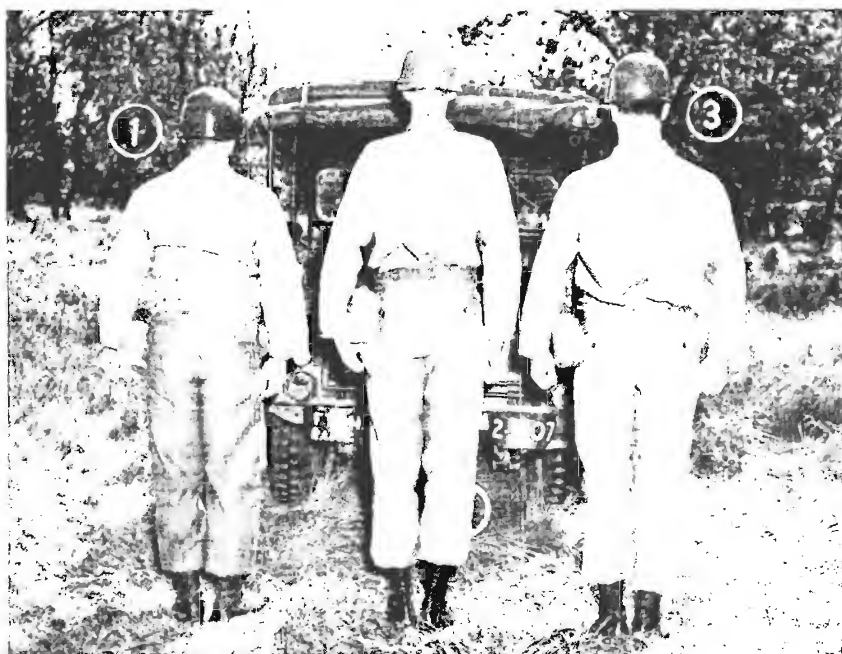
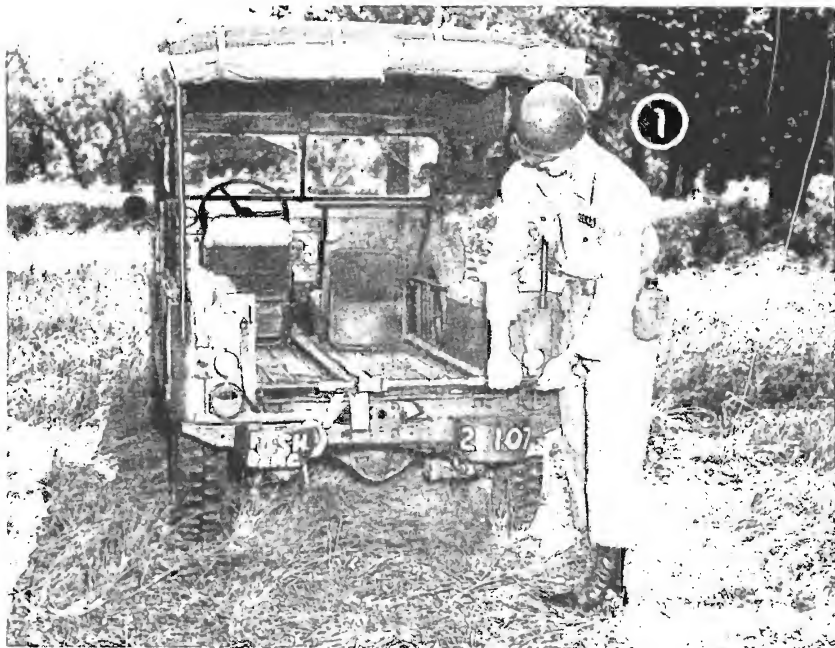


Figure 151.1. (Added) Ambulance post.



*Figure 151.2. (Added) Lowering tailgate.*

ambulance is now ready for loading and all men reassemble to the rear of the ambulance.

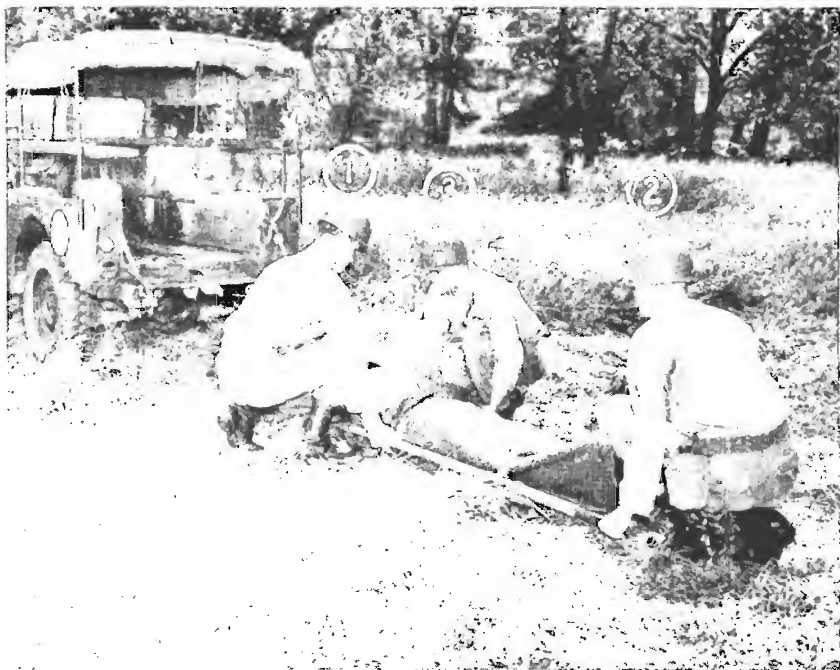
- (3) The third command is: 1. Right Upper Berth, Prepare to Load, 2. LOAD. At the preparatory command, bearers take positions as follows: No. 2 man at foot of litter and facing the patient, stoops and grasps handles; Nos. 1 and 3 men, one on each side of the litter and facing the patient's shoulders, grasp the left and right poles, respectively (fig. 151.5). At the command LOAD, the litter is lifted and carried to the ambulance; the front stirrups are placed in the grooves of the upper berth (fig. 151.6) and the No. 2 man slides the litter into the berth. No. 1 man enters the ambulance; No. 3 man goes to the right front entry of the ambulance and secures the litter to the berth at the head and No. 2 man secures the litter at the berth at the foot, with the litter securing devices attached to the litter rack (fig. 151.7). When this is accomplished, the squad reassembles without command as described in (1) above.
- (4) The right lower berth is loaded next and consists of two grooved tracks bolted to the floor of the vehicle. The command is: 1. Right Lower Berth Prepare to Load,



*Figure 151.3. (Added) Arranging front seat in crash pad position and untying litter rack.*



*Figure 151.4. (Added) Setting up, right upper litter rack.*



*Figure 151.5. (Added) Right upper berth, prepare to LOAD.*



*Figure 151.6. (Added) LOAD.*





*Figure 151.7. (Added) Securing litter to litter rack.*

2. **LOAD.** At the command of preparation, the procedure is identical with that outlined in (3) above. At the command **LOAD**, the litter is carried to the ambulance; the front stirrups are placed in the grooves of the berth (fig. 151.8). No. 2 man slides the litter forward. After the litter is in place, Nos. 1 and 3 men raise and lock the tailgate, thus securing the litter.

- (5) The third litter is loaded on the left side of the vehicle just above the seat for ambulatory patients. The command is: 1. Left Berth Prepare to Load, 2. **LOAD.** At

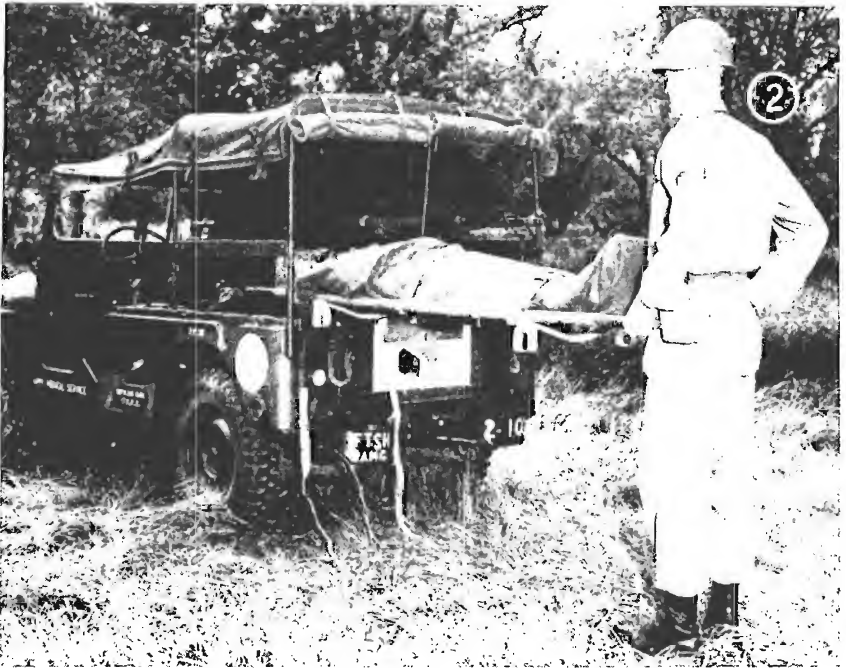


*Figure 151.8. (Added) Placing litter into lower berth.*

the preparatory command, the procedure as outlined in (3) above, is followed. At the command of execution the litter is carried to the ambulance, raised above the tailgate, and lifted into the ambulance; Nos. 1 and 3 men rest their end of the litter on the rear litter supports of the left berth (fig. 151.9). No. 1 man enters the ambulance from the front, comes to the rear of the ambulance, and grasps both handles at the head of the litter; with No. 2 man at the foot of the litter, they carry the litter to the front of the ambulance. No. 3 man proceeds to the front of the ambulance on the left side and assists No. 1 man in placing the litter handles into the litter support rings, mounted on each side of the driver's seat. No. 2 man places the rear handles of the litter in the rear litter support braces and secures the rear stirrups to the back of ambulance with the straps that are attached for that purpose (fig. 151.10). Bearers unfurl and secure curtains at positions indicated in (2) above. Loading the ambulance is now complete.

*c. To Unload the Ambulance.* In unloading the ambulance the litter on the left side is unloaded first.

(1) The first command is: 1. Ambulance, 2. POSTS. At the



*Figure 151.9. (Added) Litter handles resting on rear litter support of the left berth.*



*Figure 151.10. (Added) Securing left litter to ambulance.*

command POSTS, the squad falls in as described in *b* (1) above (fig. 151.1).

- (2) The second command is: 1. Prepare Ambulance For, 2. UNLOADING. At this command, bearers take positions and furl curtains as indicated in *b* (2) above. No. 2 man then unfastens the straps securing the foot of the litter to the ambulance. Nos. 1 and 3 men go to the left side and No. 1 man enters ambulance (fig. 151.11).
- (3) The third command is : 1. Left Berth Prepare to Unload, 2. UNLOAD. At the preparatory command Nos. 1 and 3 men grasp the litter handles at the patient's head; No. 2 man grasps the litter handles at the patient's feet. At the command UNLOAD, all three men lift the litter and move it towards the rear until the litter handles at the patient's head are clear of the front litter supports. No. 1 man then takes hold of both handles, at the patient's head, and with No. 2 man carries it to the rear of the ambulance, where the litter handles are rested on the rear supports (fig. 151.12). No. 1 man comes out of the ambulance and, with No. 3 man, grasps the right and left poles, respectively. The three bearers lift the litter from the ambulance and carry it at least three paces to the rear of the



*Figure 151.11. (Added) Prepare ambulance for UNLOADING.*

ambulance and place it on the ground (fig. 151.13). The squad then resumes, without command, the positions described in (1) above.

- (4) The fourth command is: 1. Right Lower Berth Prepare to Unload, 2. UNLOAD. At the command of preparation No. 2 man lowers the tailgate; Nos. 1 and 3 men take their positions, one on each side of the litter; No. 2 man grasps the litter handles at the casualty's feet. At the command UNLOAD, No. 2 man pulls the litter from the berth while Nos. 1 and 3 men grasp the litter poles at the patient's shoulders, as it slides out of the berth (fig. 151.14). Prior to the time the stirrups at the head of the litter reach the end of the grooved tracks, No. 1 man halts the three bearers in place. (This is done to prevent the patient's head from striking the floor of the ambulance.) The three bearers lift the litter from the berth, carry it at least three paces to the rear of the ambulance, and place it on the ground. When this is accomplished, the squad reassembles to the rear of the ambulance without command.
- (5) The right upper berth is unloaded last. The command is: 1. Right Upper Berth Prepare to Unload, 2. UNLOAD.



*Figure 151.12. (Added) Litter handles resting on rear litter supports of left litter rack.*



*Figure 151.13. (Added) Depositing patient three paces to the rear of ambulance.*

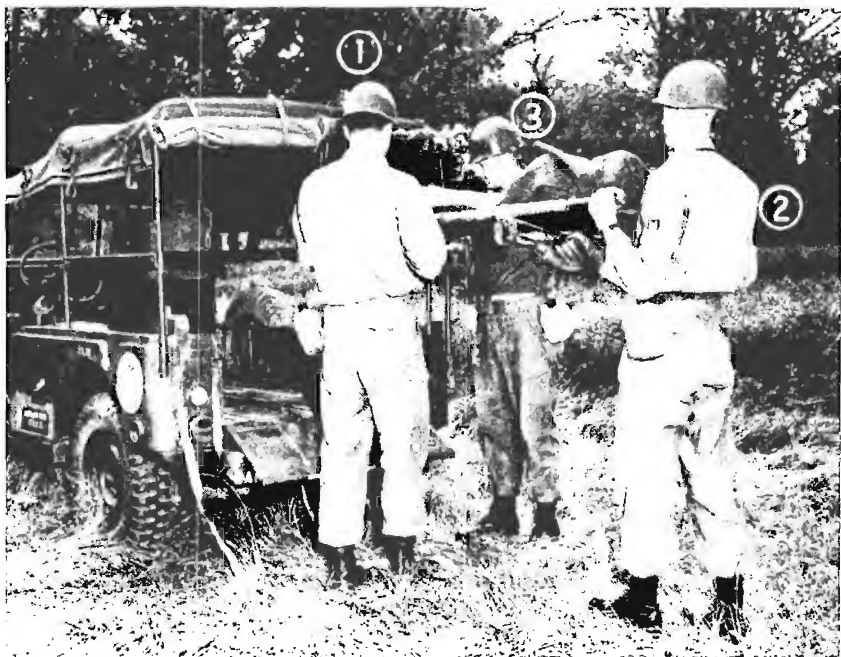


*Figure 151.14. (Added) Right lower berth prepare to unload, UNLOAD.*

At the preparatory command No. 1 man enters the ambulance from the rear and releases the litter securing rings from the litter handles at the patient's head. No. 2 man unfastens the straps securing the litter to the berth at the feet. When this is accomplished, Nos. 1 and 3 men take their positions, one on each side of the litter, to the rear of the ambulance; No. 2 man grasps the rear handles of the litter. At the command UNLOAD, No. 2 man pulls the litter from the berth. Nos. 1 and 3 men grasp the litter poles toward the head as the litter slides out, keeping it level at all times (fig. 151.15). The litter is lowered to the litter carry position, and all three bearers carry it at least three paces from the ambulance and place it on the ground.

- (6) When unloading is completed, No. 1 man raises and locks the tailgate. Bearers then unfurl and secure curtains at positions indicated in *b*(2) above. When this is accomplished, the squad reassembles as described in (1) above, without command.

91. Truck, ¼-Ton, Fitted with Litter Securing Bracket  
(Rescinded)



*Figure 151.15. (Added) Right upper berth prepare to unload, UNLOAD.*



### 93.1 Carrier, Light Weapons, Infantry, ½-ton, 4x4

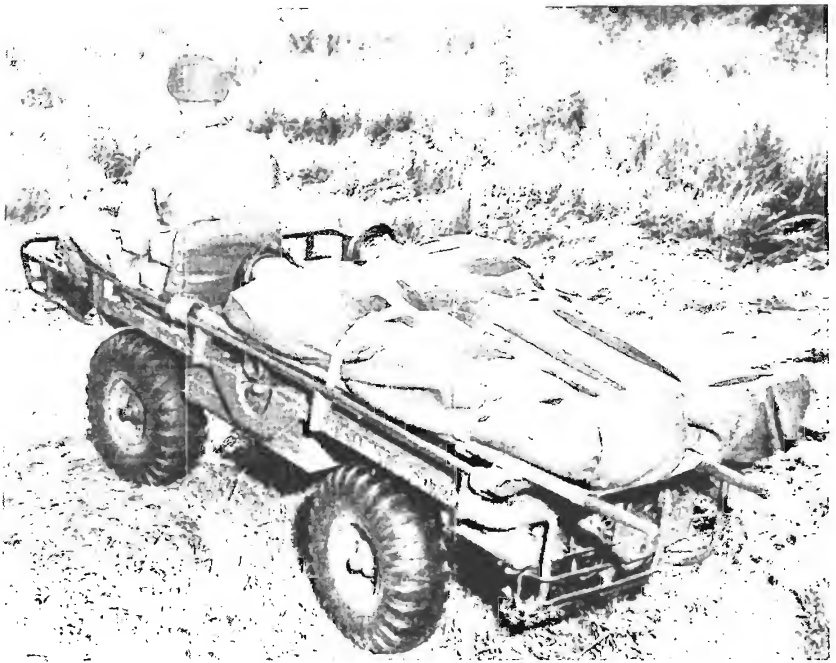
(Added)

The small size and cross-country mobility of this vehicle make it an expedient casualty carrier for forward units. It can be used to transport up to four patients (fig. 163.1), with the most satisfactory method being that with two patients lying parallel to the long axis of the chassis (fig. 163.2). When more than two patients are transported they must be placed across the body of the vehicle (fig. 163.3). When transporting four patients, the driver is required to operate the vehicle in the "off carrier" position (fig. 163.1). The litters are easily loaded; however, the patient and the litter must be secured to the vehicle, regardless of the nature of the terrain or the number of patients transported. The litter securing strap may be used to accomplish this.



*Figure 163.1. (Added) Carrier, light weapons, infantry, ½-ton, 4x4, transporting four patients, with driver in "off carrier" position.*





*Figure 163.2. (Added) Carrier, light weapons, infantry, 1/2-ton, 4x4, transporting two patients.*



*Figure 163.3. (Added) Carrier, light weapons, infantry, 1/2-ton, 4x4, transporting three patients.*

By Order of *Wilber M. Brucker*, Secretary of the Army:

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*Chief of Staff.*

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US Army Corps (Res) (1)  
Sector Comd, US Army  
Corps (Res) (1)  
MAAG (2)  
Mil Mis (1)

NG: State AG (6); units—same as Active Army.

USAR: Same as Active Army.

For explanation of abbreviations used, see AR 320-50.

## TRANSPORTATION OF THE SICK AND WOUNDED

	Paragraphs	Page
CHAPTER 1. GENERAL.....	1-3	3
2. MANUAL TRANSPORTATION		
Section I. One-man carries.....	4-13	4
II. Two-man carries.....	14-19	20
III. Special manual evacuation techniques.....	20, 21	30
CHAPTER 3. LITTER TRANSPORTATION		
Section I. General.....	22, 23	34
II. Types of litters.....	24, 25	34
III. General rules for litter drill.....	26-28	40
IV. Instruction with unloaded litters.....	29-45	41
V. Instruction with loaded litters.....	46-52	60
VI. Dressing the litter.....	53-56	74
VII. Litter obstacles.....	57-66	77
VIII. Improvised litters.....	67-72	95
CHAPTER 4. AIDS IN LITTER TRANSPORTATION		
Section I. Litter aids.....	73-75	100
II. Litter evacuation in snow and extreme cold.....	76, 77	105
III. Litter evacuation in mountain operations.....	78-84	107
CHAPTER 5. MOTOR AMBULANCE TRANSPORTATION		
Section I. General.....	85-87	112
II. Instruction in ambulance loading and unloading.....	88-92	120
CHAPTER 6. CONVERSION OF MILITARY VEHICLES TO CASUALTY CARRIERS.....	93-99	144
7. RAIL TRANSPORTATION.....	100-103	151
8. AIR EVACUATION		
Section I. Introduction.....	104-107	156
II. Preparation of casualties for aeromedical evacuation.....	108-112	158
III. Types of aircraft employed in air evacuation.....	113-117	162
IV. Loading casualties aboard aircraft.....	118-120	176
CHAPTER 9. WATER TRANSPORTATION.....	121-127	184
INDEX.....		192

\*This manual supersedes FM 8-35, 28 February 1945.



# CHAPTER 1

## GENERAL

---

### 1. Purpose and Scope

This manual describes the principal methods and means of transporting the sick and wounded. It includes a description of the common methods of transporting casualties on land, sea, and in the air.

### 2. Relation of Transportation to the Medical Task

*a.* One of the chief responsibilities of the medical services of the Armed Forces is the evacuation of the sick and wounded. Evacuation by overland means is normally a responsibility of the army medical service. Aeromedical evacuation within the combat zone, to include battlefield pickup of casualties, is an Army function. Aeromedical evacuation of casualties from within the combat zone to points outside the combat zone is a function of the Air Force. The Navy has the responsibility for the evacuation of the sick and wounded by ship.

*b.* Medical evacuation is the movement of casualties from the site of wound, injury, or illness to a medical installation which can provide the treatment and care which they require. After casualties are collected on the battlefield, their prompt and orderly evacuation from forward areas, in a manner least likely to interfere with other military requirements, allows combat units to preserve their mobility and promotes the morale of the remaining effective troops. The process of evacuation must be continuous and must be carried out as rapidly as possible without endangering life and limb. The transport employed in this movement will be determined by the particular condition existing in various stages of the journey. When necessary, means of transport must be improvised.

### 3. General

*a.* Knowledge of the correct methods of transporting seriously injured casualties is one of the most important parts of first aid or emergency medical treatment. Careless or rough handling may not only increase the seriousness of an injury, but may even result in death. Unless there is good reason for moving a casualty, he should not be moved until medical facilities are available.

*b.* If it is necessary to move a casualty before trained medical personnel are available, needed first aid treatment should be given before attempting to move the casualty. If it is suspected that the casualty has a fractured arm, leg, spine, or pelvis, he should not be moved until the injured part has been immobilized.

## CHAPTER 2

# MANUAL TRANSPORTATION

---

### Section I. ONE-MAN CARRIES

#### 4. General

All manual carries are tiring for the bearer, or bearers, and may harm the casualty. Manual carries are used only when a litter is not available or when it is necessary to move a casualty to save his life. Occasionally manual carries are necessary as a result of terrain features or of enemy action being such as to prohibit movement of a litter squad.

#### 5. Fireman's Carry

The fireman's carry is one of the easiest methods for one man to carry the entire weight of another. It may be used for an unconscious person. Mastery of this carry is of special importance, as the preliminary steps of the fireman's carry are used in many other one-man carries. An unconscious or disabled person can be raised from the ground in the manner illustrated in the first three steps of the fireman's carry. After moving the casualty to an upright position, any of several other one-man carries may be used to transport him (figs. 1-7).



*Figure 1. Fireman's carry; first step. Casualty is turned face down on ground.*



*Figure 2. Fireman's carry; second step. Casualty's head is supported on his arm.*

## **6. Supporting Carry**

After raising the casualty from the ground (as in the fireman's carry), his left (right) wrist is grasped by the bearer's left (right) hand and his arm is drawn around the bearer's neck. The casualty is thus able to walk, using the bearer as a crutch. This carry is useful when the casualty is only slightly injured, such as in foot and ankle injuries (fig. 8).

## **7. Arms Carry**

This is a good method for carrying an injured person short distances. When the casualty is carried high, it lessens fatigue. Never use this carry when it is suspected that the casualty has a fractured back, leg, or pelvis (fig. 9).

## **8. Saddleback Carry**

Having raised the casualty to an upright position, the bearer maintains a pull on the casualty's arm and steps in front of him. The bearer then stoops and the casualty is raised to the bearer's back. The casualty encircles the bearer's neck with his arms, and the bearer clasps his hands beneath the casualty's thighs. This carry can only be used when the casualty is conscious (fig. 10).

## **9. Pack-Strap Carry**

After raising the casualty from the ground, the bearer steps in front of him. The casualty's wrists are grasped, and he is hoisted so that his armpits are over the bearer's shoulders. This is a good way of



*Figure 3. Fireman's carry; third step. Casualty is straddled and lifted by placing hands under his armpits.*





*Figure 4. Fireman's carry; fourth step. Casualty is supported by placing an arm around his waist and moving to his front.*



*Figure 5. Fireman's carry; fifth step. Bearer grasps casualty's right hand with his left hand and bending at the waist pulls casualty's right arm around the back of his neck. Casualty's right arm is pulled down so that his body comes across the bearer's back. Bearer then grasps the casualty's right leg at the knee with his right hand.*



*Figure 6. Fireman's carry; sixth step. Casualty is lifted as bearer straightens up, holding casualty's right wrist in his left hand and the casualty's right knee in his right hand.*



*Figure 7. Fireman's carry; seventh step. Casualty's right wrist is then grasped in bearer's right hand leaving left hand free. This is the position of carry. A man can carry another some distance in this manner.*



*Figure 8. Supporting carry.*



*Figure 9. Arms carry.*



*Figure 10. Saddleback carry.*



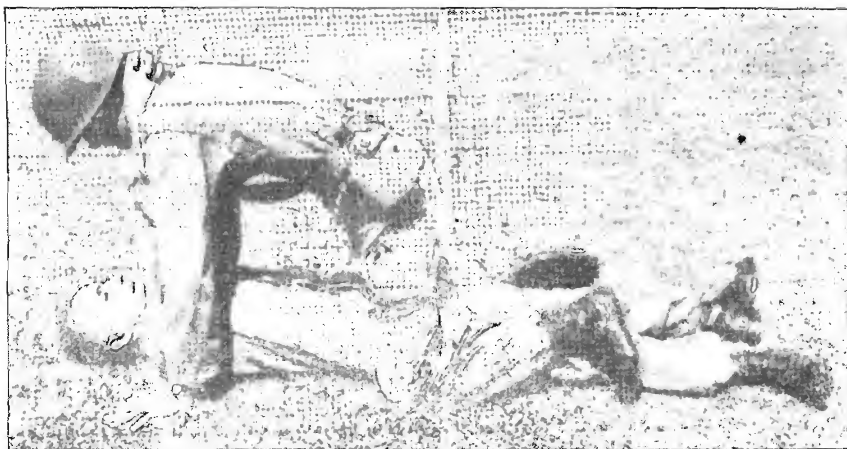
*Figure 11. Pack-strap carry.*

carrying an unconscious man, but it must not be used if there is evidence of a fractured arm, leg, spine, or pelvis (fig. 11).

#### **10. Neck (Fireman's) Drag**

The casualty's hands are placed or tied around the bearer's neck, enabling the bearer to crawl along and drag the casualty who may be unconscious. This method has the advantage of permitting both the bearer and the casualty of remaining close to the ground and thus protected, if in battle. *Never* attempt to drag a man if it is suspected that he has a fractured neck, back, or pelvis (fig. 12). If the patient is unable to support himself with his hands around the bearer's neck, his wrists should be tied together, so that his arms form a loop through which the bearer can place his head.





*Figure 12. Neck drag.*

## **11. Pistol-Belt Carry**

*a.* This carry is easily learned, and can be accomplished with items of equipment which will always be present with, or on, the soldier. It will permit the soldier to transport a casualty with a considerable degree of comfort for long distances over all types of terrain. Although this one-man carry is commonly known as the "pistol-belt carry, it can be accomplished with one rifle sling; two pistol belts; two triangular bandages; two litterstraps, or any other equipment that will make a loop 2 feet in diameter.

*b.* After treating the wounds or splinting the fracture of the injured man in the appropriate manner, two pistol belts or other equipment are linked together to form a continuous belt under the casualty's thighs and hips so that a loop extends from each side (fig. 13).

*c.* The bearer lies between the wounded man's extended legs and thrusts his arms through the belt loops. The bearer grasps the wounded man's right (left) hand with his left (right) hand and the casualty's right (left) trouser leg with his right (left) hand (fig. 14). Then rolling toward the uninjured side, he rolls over to the prone position, carrying the wounded man onto his back. Necessary adjustments of slings are made before proceeding (fig. 15).

*d.* The bearer rises to kneeling position; and the continuous belt holds the casualty firmly in position (fig. 16).

*e.* The bearer places one hand on his knee for support then rises to an upright position. The casualty is now supported on the bearer's shoulders and held in position by the continuous belt, and will ride comfortably, whether conscious or not (fig. 17).

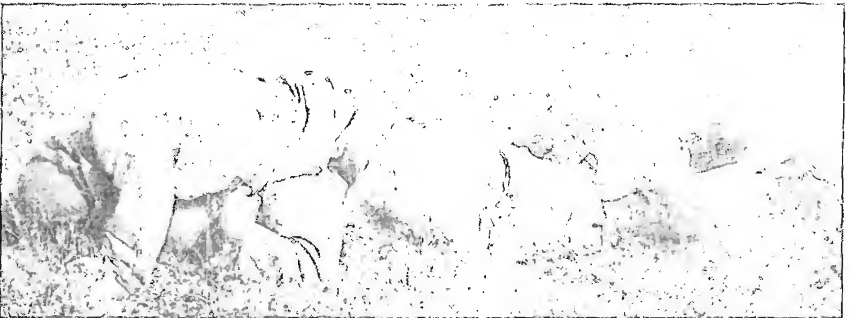
*f.* The bearer is now ready to move with his hands and arms unencumbered by the necessity of supporting the casualty. The bearer



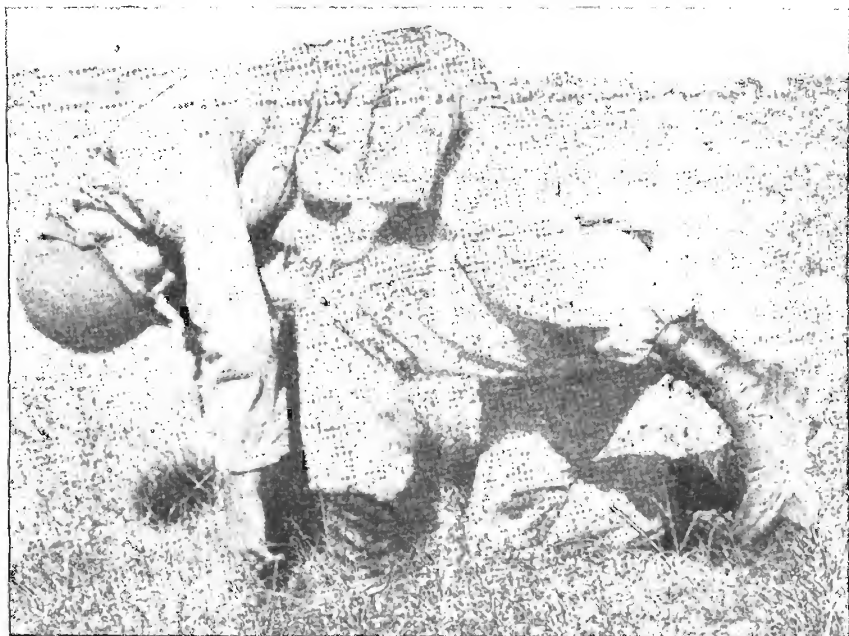
*Figure 13. Pistol-belt carry; first step. Belt in position.*



*Figure 14. Pistol-belt carry; second step. Bearer in position.*



*Figure 15. Pistol-belt carry; third step. Rolling casualty onto bearer's back.*



*Figure 16. Pistol-belt carry; fourth step. Bearer rises to kneeling position.*

can use his hands in climbing steep banks or in surmounting all types of obstacles. In this manner a strong man can carry another for quite some distance without undue fatigue.

## **12. Pistol-Belt Drag**

Two pistol belts, or similar objects are extended their full length and joined together to make one continuous loop. After the bearer rolls the casualty on his back, the loop is passed over the casualty's head and worked into position across his chest under his armpits. Then the belts are crossed under the casualty's head (fig. 18). The bearer turns around, lying on his abdomen slightly to the casualty's side. The loop is slipped over the bearer's arm and shoulder on the side away from the casualty. Then the bearer advances by crawling and drags the casualty along (fig. 19). This carry has the advantage of permitting both bearer and casualty to remain close to the ground, thus being protected from enemy fire. This carry can be used for very short distances only.

## **13. Back Lift and Carry**

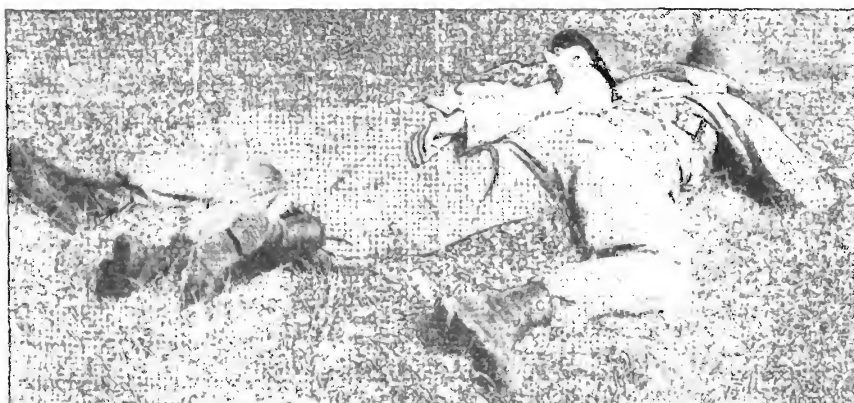
To use this carry, the casualty must be conscious and able to stand on at least one foot. After raising the casualty to a standing position, the bearer stands back to back with the casualty supporting his weight. The casualty raises his arms sideways, the bearer stoops and grasps the casualty's upper arms (fig. 20). The bearer then bends forward pulling the casualty onto his back (fig. 21).



*Figure 17. Pistol-belt carry; final step. Casually supported by continuous belt.*



*Figure 18. Pistol-belt drag; loop in position.*



*Figure 19. Pistol-belt drag.*



*Figure 20. Back lift and carry; raising casualty.*



*Figure 21. Back lift and carry; carrying position.*

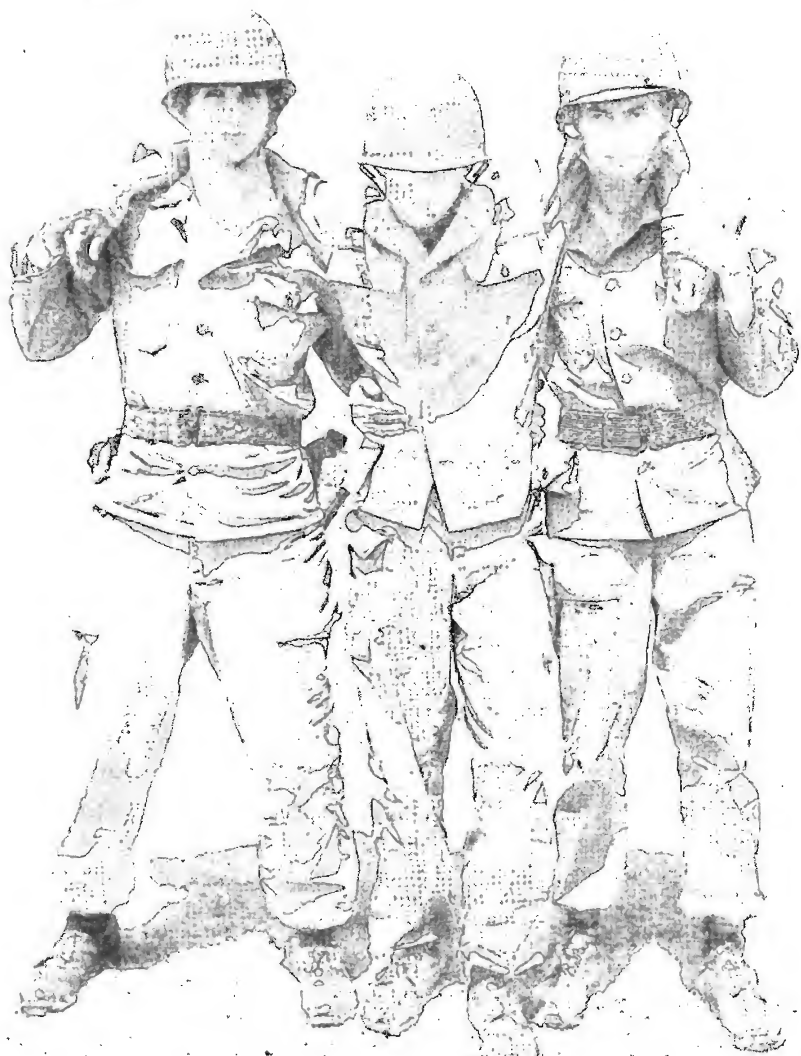
## **Section II. TWO-MAN CARRIES**

### **14. General**

If two bearers (or aidmen) are available, a two-man carry may be used. Two-man carries are more comfortable for the casualty, enable the bearers to carry him further, and are less likely to aggravate the casualty's injuries.

### **15. Two-Man Supporting Carry**

This carry is easy and often used. It may be used safely if the casualty is unconscious; but if there is evidence of a fractured arm, leg, spine, or pelvis, this method should not be used (fig. 22).



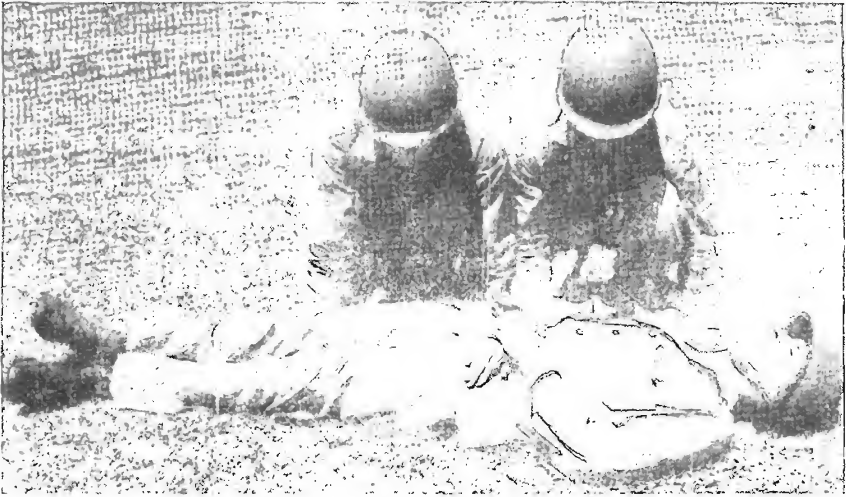
*Figure 22. Two-man supporting carry.*

### **16. Two-Man Arms Carry**

This carry is particularly suited to lifting a casualty onto a litter or other carrier.

*a. First Step* (fig. 23). Bearers kneel at casualty's side. One bearer places one arm beneath the casualty's shoulders and the other arm beneath his back. The second bearer places his arms beneath the casualty's hips and knees.

*b. Second Step* (fig. 24). Bearers lift the casualty to their knees.



*Figure 23. Two-man arms carry; first step. Bearers slide arms under casualty.*



*Figure 24. Two-man arms carry; second step. Bearers lift casualty to their knees.*





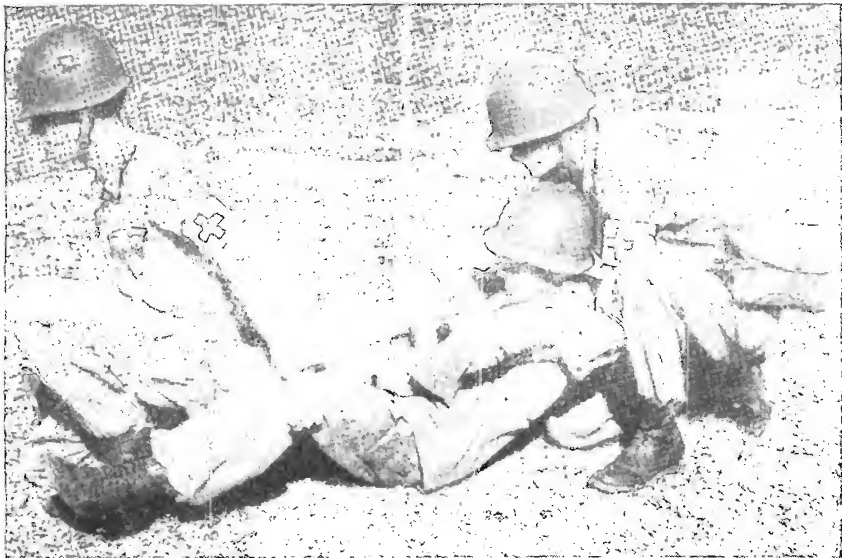
*Figure 25. Two-man arms carry; third step. Bearers rise, lifting casualty to their chests.*

*c. Third Step* (fig. 25). Bearers rise together lifting the casualty to their chests. Carrying the casualty high on the chest lessens fatigue.

### **17. Two-Man Saddleback Carry**

This is a good method of carrying an unconscious person a short distance. It should never be used if it is suspected that the casualty has a fractured arm, leg, spine, or pelvis.

*a. First Step* (fig. 26). With the casualty lying on his back, the front bearer spreads the casualty's legs, steps between them, kneels, and grasps the patient behind the knees. The rear bearer kneels at the casualty's head and thrusts his arms under the casualty's armpits and across his chest.



*Figure 26. Two-man saddleback carry; first step. Bearers in position ready to lift.*

*b. Second Step* (fig. 27). Bearers rise together, lifting the casualty.

#### **18. Four-Hand Carry (Packsaddle Carry)**

This is a good carry for injuries of the head or feet. The casualty must be conscious so that he can hold on.

*a. First Step* (fig. 28). Each bearer grasps his own left wrist with his right hand, and then grasps the other bearer's right wrist with his left hand.

*b. Second Step* (fig. 29). The casualty then sits on the interlocked hands of the bearers, supporting himself by placing an arm around each of their necks.

#### **19. Two-Hand Carry**

If the casualty is unconscious, a modification of the packsaddle carry may be used. Each bearer passes an arm under the casualty's thighs and grasps the other's wrists (fig. 30).

*a.* The casualty is raised and supported in an upright position.

*b.* As the casualty sits on the seat thus formed, bearers grip each other's arms under the casualty's arms and behind his back and proceed (fig. 31).



*Figure 27. Two-man saddleback carry.*



*Figure 28. Four-hand carry; position of hands.*



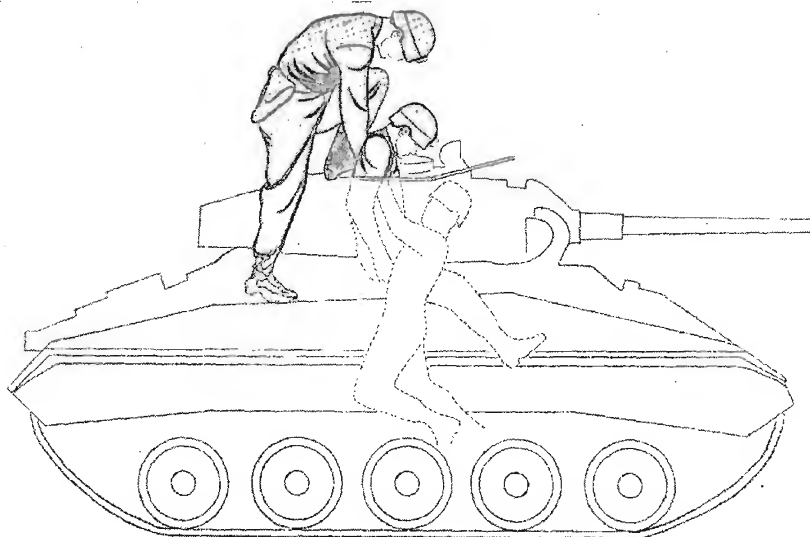
*Figure 29. Four-hand carry.*



*Figure 30. Two-hand carry.*



*Figure 31. Two-hand carry. Position of hands under casualty.*



*Figure 32. Removing a casualty from a tank turret; first step.*

### **Section III. SPECIAL MANUAL EVACUATION TECHNIQUES**

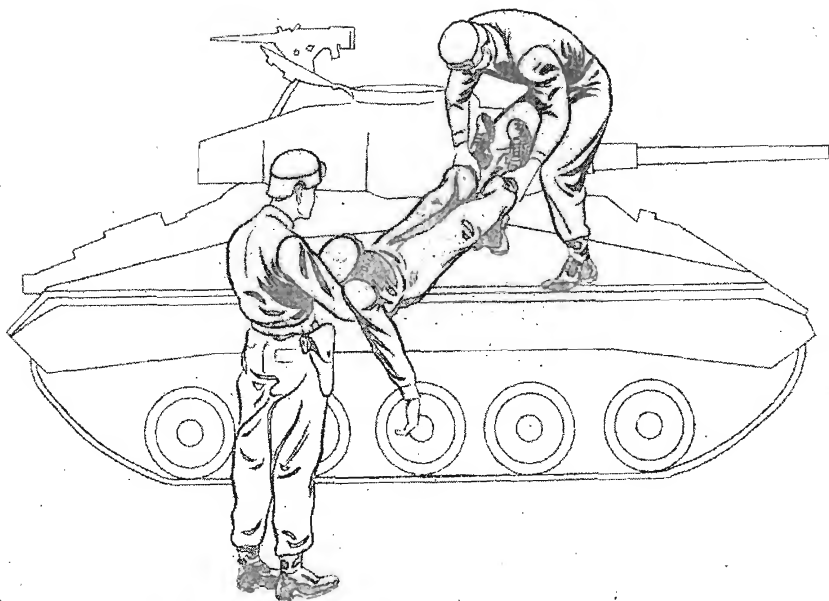
#### **20. Removal of Casualties From Tanks**

Seriously wounded men are difficult to handle in the cramped interior of a tank, especially if they are unconscious. Medical service personnel must remember that speed is essential in this type of evacuation. A stationary tank is a good target, and all combat-disabled armored vehicles are liable to burn or explode. For this reason it may be necessary to first remove the casualty, and then give emergency medical treatment. If at all possible, two soldiers should remove the casualty. If a soldier must operate alone, he uses a pistol belt or similar device to life the injured man.

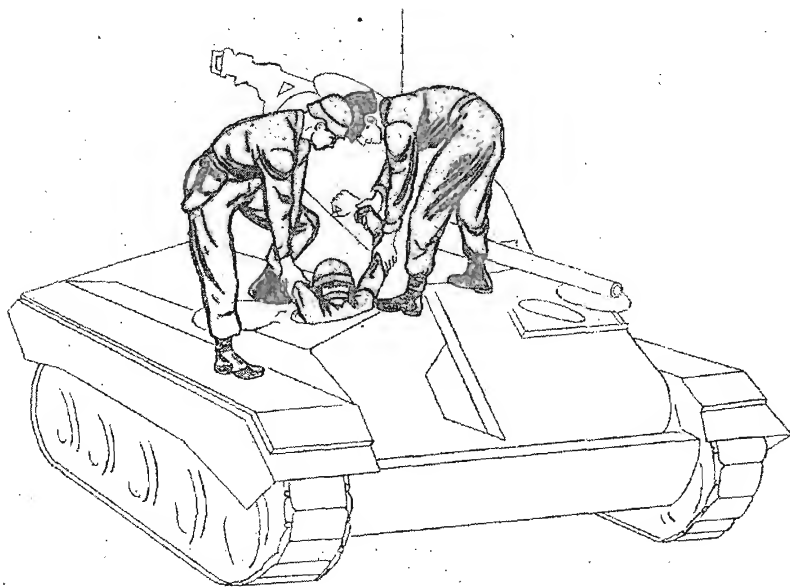
*a. Removal From the Turret.* One soldier goes into the tank and supports the casualty from below. The other soldier stands atop the turret and lifts the casualty through the hatch (fig. 32). He then holds the casualty in place on the hatch rim, while stepping to the fender or stowage chest of the tank and supports the casualty until the soldier inside the tank can get outside and jump to the ground. The casualty is then lowered into the arms of the man on the ground (fig. 33).

*b. Removal From the Driving Compartment.* The hatch is opened, and by reaching down, the casualty's arms are folded across his chest. The injured man is turned until he faces the rear. With a man standing on either side of the hatch, the casualty is lifted until he is sitting





*Figure 33. Removing a casualty from a tank turret; second step.*



*Figure 34. Removing a casualty from driving compartment; first step.*



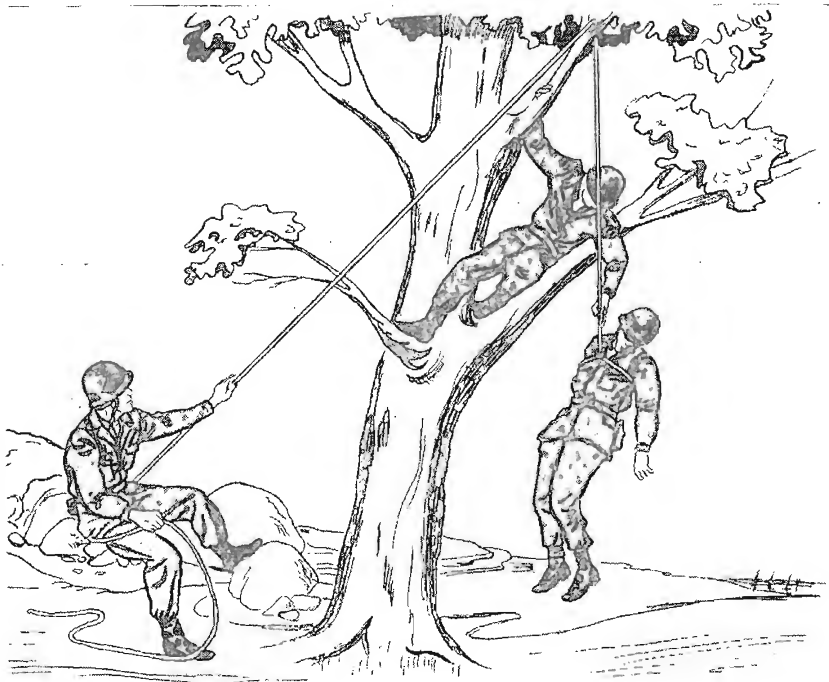
*Figure 35. Removing a casualty from driving compartment; second step.*

on the hatch rim (fig. 34). One soldier jumps to the ground, while the other lowers the casualty down the front slope plate (fig. 35).

## **21. Removal of Casualties From Trees**

*a.* During airborne and mountain operations, it may be necessary to remove casualties from trees. The method to use will vary, depending upon the size of the tree, the foliage, the strength of branches, the manner in which the casualty is wedged, and the help available.

*b.* One man climbs the tree and attaches a rope under the armpits of the injured man, steadying him so that he does not fall. A bowline knot or some other knot should be used which will not slip. The other end of the rope, thrown over a higher limb, is held by a man on the ground, or secured to a tree or boulder (fig. 36). First aid may be administered in the tree, if necessary. In an emergency, one man can climb the tree, attach the rope, climb down to the ground, and lower the injured man to safety. Airborne troops carry a special rope which may be used, or the shrouds of the parachute may be employed. Medical service troops engaged in mountain warfare carry extra rope for lashing litters and evacuation aids. See FM 70-10 for additional information on mountain combat and equipment.



*Figure 36. Removing a casualty from a tree.*

## CHAPTER 3

### LITTER TRANSPORTATION

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#### Section I. GENERAL

##### 22. Litters

A litter is any device that can be carried by two or more persons, and used for transporting casualties.

##### 23. Types of Casualties

Casualties are classified as follows:

*a. Walking.* Casualties who are able to walk from the place where they became casualties to the nearest medical installation are classified as walking (or ambulant) cases.

*b. Litter.* Casualties who are unable to walk either with or without assistance, or whose condition might be aggravated by walking, are classified as litter cases.

#### Section II. TYPES OF LITTERS

##### 24. General

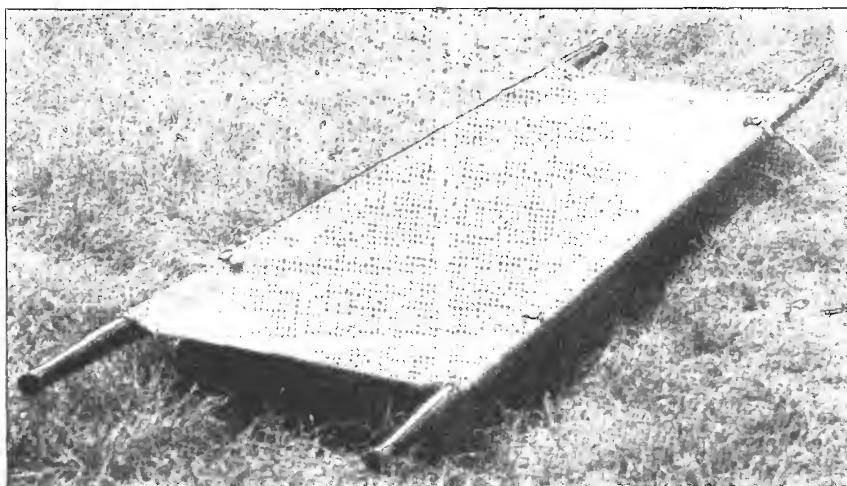
There are several different types of litters in use by the medical services of the Armed Forces. All litters, except those developed for special purposes (Stokes, mountain, and semirigid canvas litters) are of the same general dimensions when open. This allows a casualty to pass through the various methods of transportation without having to be removed from the litter upon which he is originally placed. This standardization obviates any danger to the patient resulting from changing litters and saves valuable time.

##### 25. Litters Employed by the Medical Service

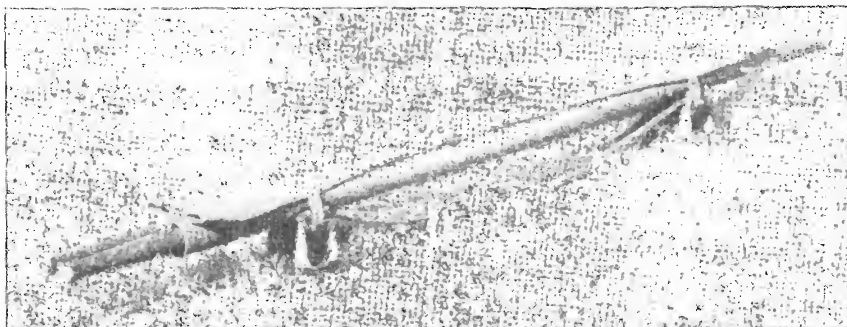
*a. Straight aluminum litter (1 and 2, fig. 37), specifications:*

Length-----	90 inches (overall).
Width-----	22 $\frac{7}{8}$ inches.
Weight-----	15 pounds.
Bed-----	Canvas, 6 feet long, 22 $\frac{7}{8}$ inches wide.
Poles-----	Aluminum alloy, 1.54 inches in diameter, 77 inches long.
Handles-----	Wooden, 6 $\frac{1}{2}$ inches long.

- Stirrups-----  $3\frac{5}{8}$  inches wide,  $4\frac{9}{16}$  inches high, with base and swivel blocks, bolted to poles, 22 inches from outer ends of handles.
- Spreader bars----- Extend crosswise at stirrups to hold canvas taut when litter is open.
- Accessories----- Two  $16\frac{1}{2}$ -inch lengths of 1-inch web strap, affixed one to each pole at the stirrup bolts, to strap the collapsed litter.
- Advantages----- Light weight: high degree of durability; folds in long axis only.



① Open

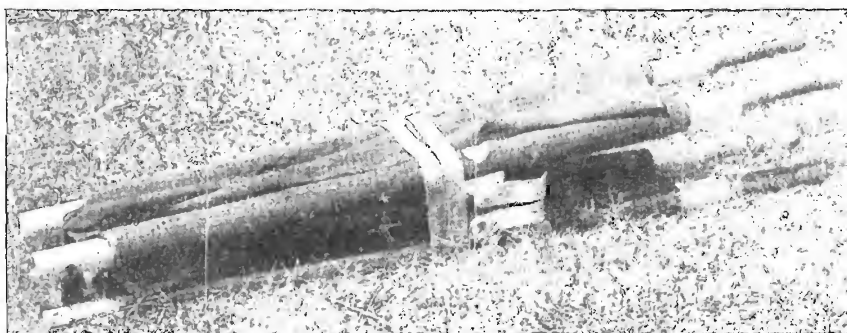


② Closed

*Figure 37. Straight aluminum litter.*

b. Folding aluminum litter (1 and 2, fig. 38), specifications:

Length.....	90 inches (overall).
Width.....	22 $\frac{7}{8}$ inches.
Weight.....	18 $\frac{3}{4}$ pounds.
Bed.....	Canvas; 6 feet long, 22 $\frac{7}{8}$ inches wide.
Poles.....	Aluminum alloy, 1.54 inches in diameter, 77 inches long; jointed at the midpoint.
Handles.....	Wooden, 6 $\frac{1}{2}$ inches long.
Stirrups.....	3 $\frac{5}{8}$ inches wide, 4 $\frac{9}{10}$ inches high, with base and swivel blocks, bolted to poles, 22 inches from outer ends of handles.
Spreader bars.....	Extend crosswise at stirrups to hold canvas taut when litter is open.
Accessories.....	Two 16 $\frac{1}{2}$ -inch lengths of 1-inch web strap, affixed one to each pole at the stirrup bolts, to strap the collapsed litter.
Advantages.....	Light weight; high degree of durability; folds in both long and short axes to facilitate storage and handling.



① Closed, folded, and strapped.



② Open.

Figure 38. Folding aluminum litter.



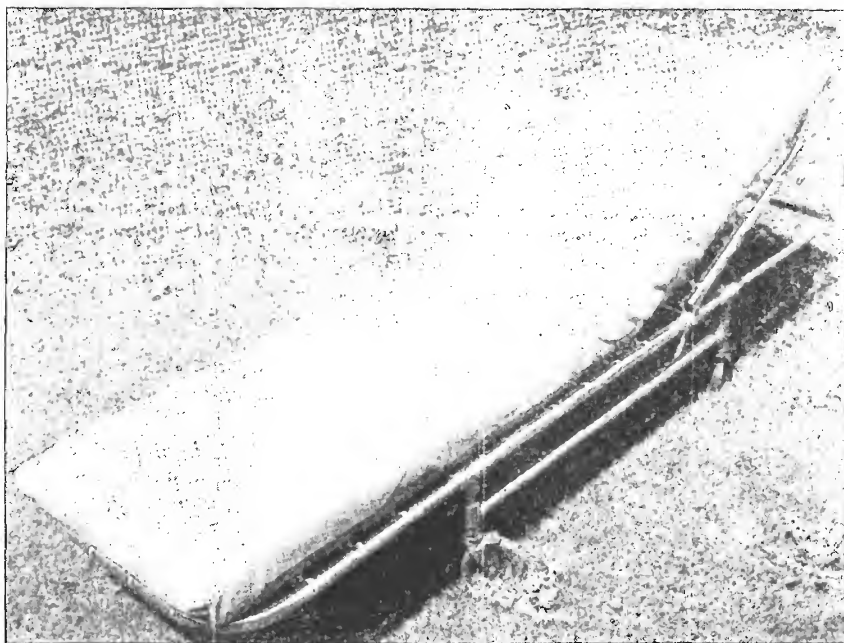
Figure 39. Stokes metal litter.

c. Stokes metal litter (fig. 39), specifications:

Length.....	7 feet.
Width.....	23 inches.
Depth.....	8 inches.
Weight.....	31½ pounds.
Bed.....	Wire mesh netting supported in a rigid frame of steel tubing. Lower half divided into two compartments to accommodate legs of patient.
Accessories.....	Securing straps at level of chest, thighs (2), and legs.
Advantages.....	Affords complete security for patient when litter is tilted.

d. Ambulance cot litter, Bomgardner type (fig. 40), specifications:

Length.....	76 inches.
Width.....	20 inches.
Bed.....	Rubberized air mattress, supported by steel springs on metal frame; metal adjustable headrest.
Advantages.....	Affords comfort for patient. Wheels afford ease of movement.
Remarks.....	Designed for use in metropolitan ambulance. Not used in advance areas.

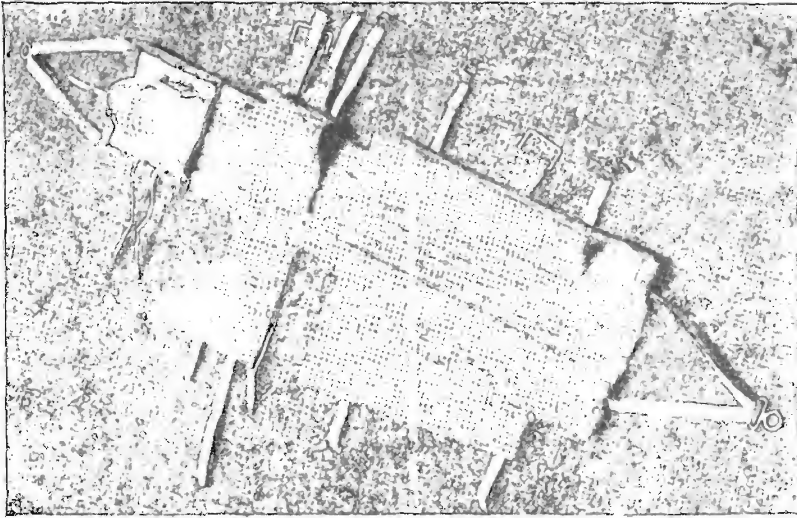


*Figure 40. Ambulance cot litter, Bomgardner type.*

*c.* Semirigid canvas litter (fig. 41), specifications:

Length-----	72 inches plus 30 inches, with straps.
Width-----	14 inches.
Bed-----	Semirigid canvas; with wooden supports.
Straps-----	7 securing straps to tie in patient.
Accessories-----	Head piece to support patient's head. Handhold loops, two at each end, for four-man carries. Four loops for slipping poles through for carrying purposes.
Advantages-----	Patient held securely in position; movement in vertical direction is facilitated. Especially useful in evacuating from ships and in mountainous areas.
Remarks-----	Designed by Navy Medical Research Institute for use in combined operations.

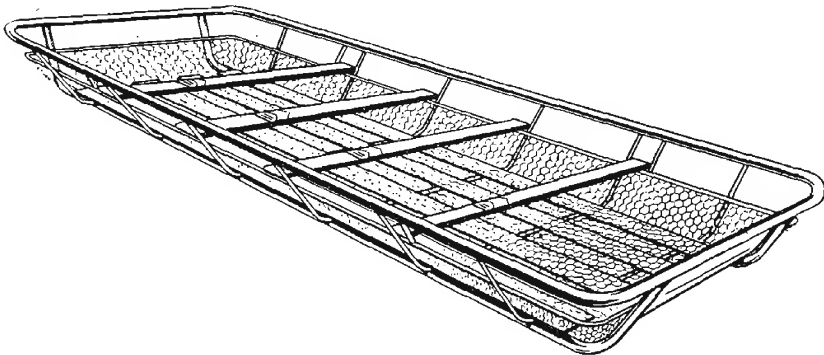




*Figure 41. Semirigid canvas litter.*

*f.* Mountain basket type litter (fig. 42), specifications:

Length_____	84¾ inches (overall).
Width_____	22¾ inches.
Bed_____	Wire mesh supported by steel tubing. Four runner boards act as bottom supports.
Accessories_____	Four web securing straps.
Advantages_____	Affords security for casualty when litter is tilted. The litter can be pulled on the ground without injury to the casualty.
Remarks_____	Designed for use in mountain operations.



*Figure 42. Mountain basket type litter.*

### Section III. GENERAL RULES FOR LITTER DRILL

#### 26. General

*a. Purpose.* The purpose of this section is to provide a guide for the instruction of personnel in methods of handling litters and litter cases. Use of this guide will promote uniformity in the proper methods of performing this highly important function of medical service, and, at the same time, save valuable training time.

*b. Scope.* This section includes proper methods of handling, opening, closing, and strapping litters; loading, carrying, and unloading of casualties; and the actions of bearers upon encountering unusual situations and obstacles, and when transporting casualties with injuries requiring special care.

*c. Commands.* Although litter drill is not to be considered a precision drill, certain commands should be utilized to facilitate instruction. The use of these commands in actual operations is not contemplated.

#### 27. Litter Squad

*a. Composition.* A litter squad (fig. 43), both for purposes of instruction and for actual field employment, ordinarily consists of four bearers. Fewer bearers cannot withstand the fatigue resulting from long and frequent carries.

*b. Designation of Bearers.* During instruction each bearer will be given a numerical designation. Members of a litter squad, being in line, are numbered consecutively from right to left. No. 1 is the squad leader; in his absence, No. 4 commands; if both Nos. 1 and 4 are absent, No. 3 becomes the squad leader.

*c. Duties in Reduced Squads.* Nos. 3 and 2 being absent, their duties are assumed by Nos. 1 and 4, respectively. No. 1 being absent, No. 4 assumes his duties. In his absence, the duties of No. 4 do not require replacement.

*d. Instruction in Reduced Squads.* Under exceptional circumstances, when 2-bearer squads are being instructed, the instruction will be as for Nos. 2 and 3 of the 4-bearer squad.

#### 28. Litter, Closed, Folded, and Strapped

*a. Litter, Closed.* The litter is said to be closed when the two poles are brought into approximation and the canvas is evenly and smoothly doubled upon itself.

*b. Litter, Folded.* The litter is said to be folded when, after closing, it is doubled upon itself along the long axis at the hinges provided for that purpose. Some litters have two pairs of hinges. Not all litters can be folded.

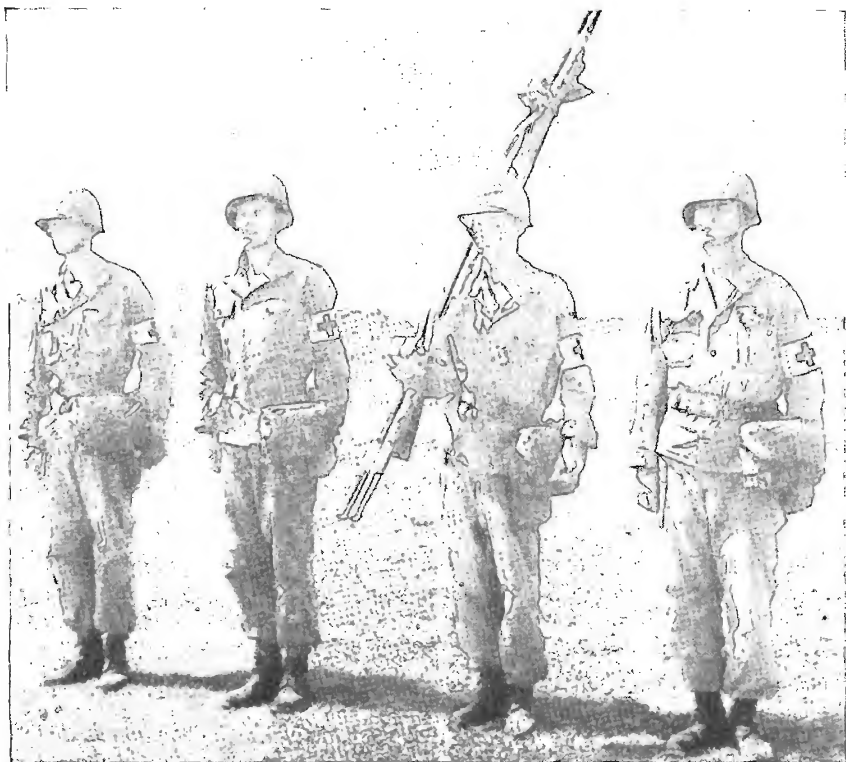


Figure 43. Litter squad.

*c. Litter, Strapped.* The litter is said to be strapped when, after closing (and folding, if a folding type litter), it is secured by the cross-straps.

#### Section IV. INSTRUCTION WITH UNLOADED LITTERS

##### 29. Formations

*a. Formation for Instruction.* To form and aline the unit (detachment, platoon, or company) in a single rank for instruction in litter drill, appropriate commands from FM 22-5 are employed. Similarly, to return the unit to its normal formation following completion of the instruction, appropriate infantry drill commands are employed.

*b. Formation of Litter Squads.* The unit being in single rank facing the front, to form litter squads, the commands are: 1. By Four, 2. Count OFF. At the command Count OFF, all men except the right file execute Eyes RIGHT; and, beginning with the right file, count ONE, TWO, THREE, FOUR, ONE, and so forth; each man turns his head and eyes to the front as he counts (fig. 44).

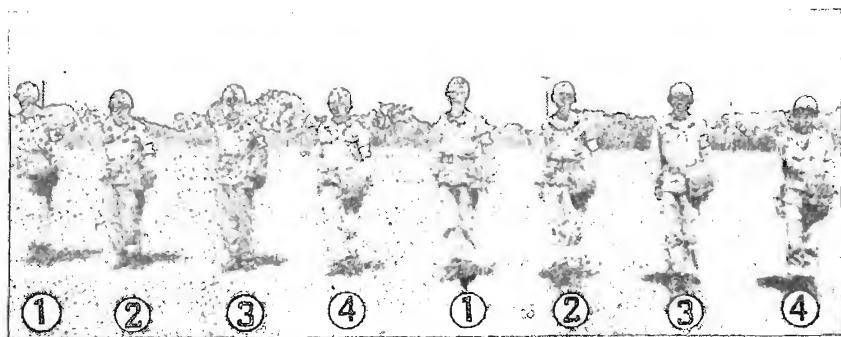


Figure 44. Formation for instruction in litter drill.

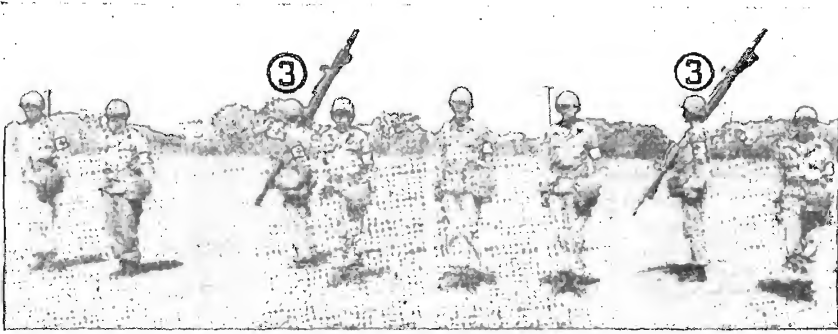


Figure 45. Procure, LITTER; first step. All No. 3 men take one step to rear.

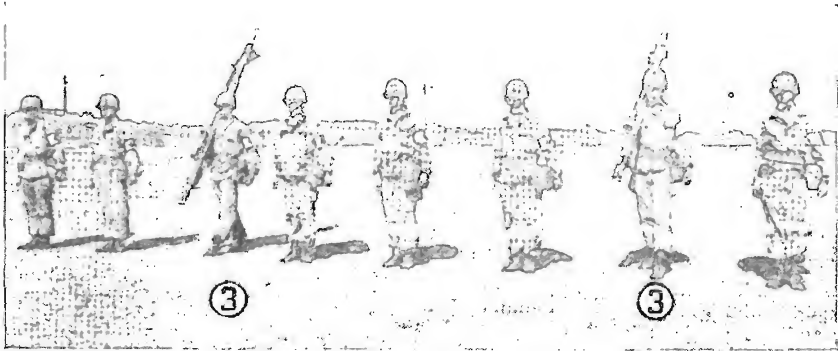
*c. Designation of Squads.* Litter squads being formed, to designate squads by number, the commands are: 1. By Litter Squads. 2. Count OFF. At the command Count OFF, No. 1 man of each squad, except the right squad executes Eyes RIGHT; and, beginning at the right, counts in consecutive order ONE, TWO, THREE, and so forth, until all squads have counted. Each No. 1 man turns his head and eyes to the front as he counts.

### 30. Procurement of Litters

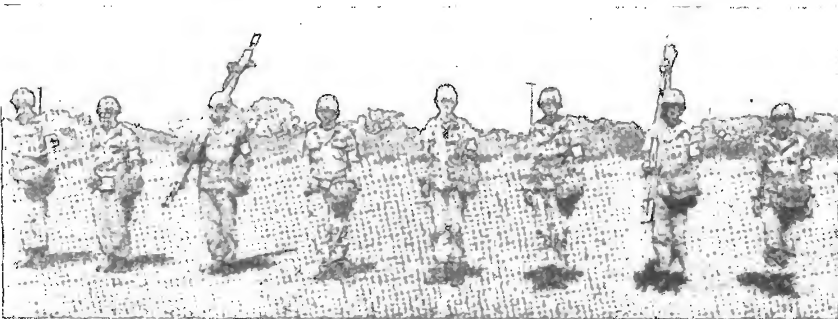
Being in proper formation and litters being available in the immediate vicinity for each litter squad to procure one litter, the commands are: 1. Procure. 2. LITTER. At the command LITTER, all No. 3 men take one step to the rear (fig. 45) execute Right (Left) FACE, as required by the location of the litters, and immediately proceed in column of files by the nearest route to the closed and strapped litters. Each takes one litter and places it on his right shoulder (par. 32); and all promptly return in reverse order to the rear of the line (fig. 46), turn, and step into the line in unison (fig. 47). Upon arriving in position, the No. 3 men bring litters to the shoulder (fig. 48). This drill should be supervised by a noncommissioned officer. It can be executed in double time.



*Figure 46. No. 3 men halted in the rear of the line after procuring litters.*



*Figure 47. No. 3 men step into line.*



*Figure 48. The command Procure, LITTER, completed.*

### **31. Return of Litters**

Instruction in the use of the litter having been completed, to return litters to the place of procurement, the commands are: 1. Return, 2. LITTER. This movement is executed in the same manner as Procure, LITTER, except that the litters are carried from, instead of to, the squads.



*Figure 49. Litter at the shoulder.*

### **32. Litter at the Shoulder**

In the position "at the shoulder," the litter is held at a  $45^{\circ}$  angle upon the right shoulder with the canvas down, the right hand grasping the lower right stirrup and the left hand at the side (fig. 49). In all motions from or to the shoulder, the litter should be brought to the vertical position against the right shoulder, canvas to the rear, right hand grasping the right lower stirrup, and left forearm horizontal with the left hand steadying the litter against the shoulder (fig. 50). The vertical position should be taken automatically by the bearer when resuming his place in line. When there is any danger of the litter striking nearby persons, the bearer brings the litter to the vertical position, resuming "at the shoulder" without command.



*Figure 50. Litter at the vertical.*

### **33. To Order Litter**

Being at the shoulder, to order litter, the commands are: 1. Order, 2. **LITTER**. At the command **LITTER**, the litter is brought to the vertical position; and carefully lowered until the lower handles are on the ground outside the right foot with the canvas to the rear. The right arm is extended naturally with the right hand grasping the poles, and the left hand is at the side.

### **34. To Shoulder Litter**

*a. From the Order.* Being at the order, to shoulder litter, the commands are: 1. Shoulder, 2. **LITTER**. At the command of execution, the litter is lifted with the left hand (fig. 52) to the vertical position

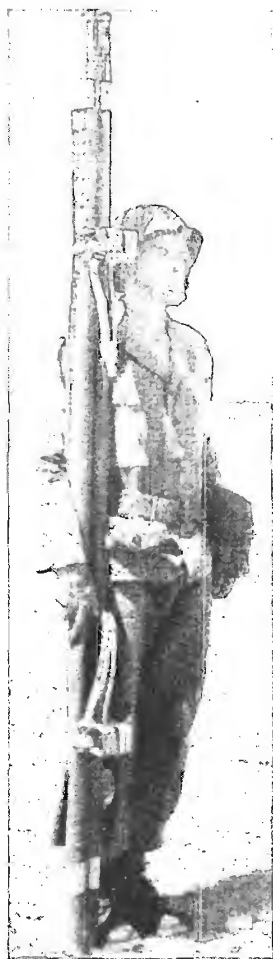


Figure 51. Litter at the order.

(fig. 50), and then raised until the left wrist is level with the chin. The litter is then laid canvas down upon the shoulder as described in paragraph 32 (fig. 49).

*b. From the Carry.* Being at the carry (par. 35), to shoulder litter, at the command LITTER, No. 3 man advances to his former position in line, at the same time bringing the litter to the vertical and then to the shoulder position. In this movement he is aided by the No. 2 man who lifts his end of the litter to the vertical as he steps backward into his former position in line. Nos. 1 and 4 men stand fast.





Figure 52. Shoulder, LITTER; first step.

### 35. To Carry Litter

*a. Being in Line.* Being in line, litters at the shoulder to carry litter the commands are: 1. Carry, 2. LITTER. At the command of execution, No. 3 man brings his litter to the vertical position, takes two steps backward (fig. 53), lowers the upper handles forward and downward until the litter is in horizontal position with the canvas up, and grasps the outside handle with his right hand. Meanwhile, No. 2 man steps to the front until he is opposite the front handles, then he grasps the outside handle with his left hand; men Nos. 1 and 4 stand fast (fig. 54).



*Figure 53. Carry, LITTER, from shoulder; first step.*



*Figure 54. Carry, LITTER, from shoulder; completed.*

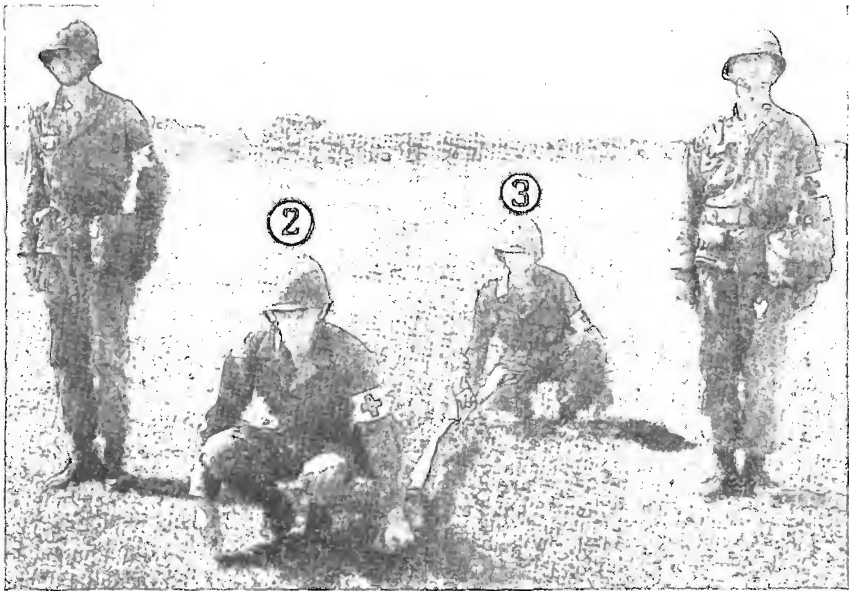


Figure 55. Carry, LITTER from ground; first step.

*b. Being at the Ground.* The litter being at the ground, at the command carry litter, men Nos. 3 and 2, using their right and left hands, respectively, stoop, grasp the outside handles (fig. 55), and raise the litter from the ground to the carry.

*c. Designation of Litter Ends.* That portion of the litter normally supported by No. 2 man is the foot; that by No. 3 man the head. With the exception of a few special movements, such as carrying casualties up or down an incline, the same designation of loaded or unloaded litter applies.

*d. Unloaded Litter in Marching.* In marching, the litter is usually at the carry, but when space permits or squads are working independently, it may be at the shoulder.

### 36. To Ground Litter

Being at the carry, to ground litter, the commands are: 1. Ground, 2. LITTER. At the command LITTER, men Nos. 2 and 3 stoop and lower litter to the ground, canvas up, release the handles, and resume erect position (fig. 56).

### 37. To Change Bearers

*a. Being at the Carry.* Being at the carry, to change bearers while marching, the commands are: 1. Change bearers, 2. MARCH. At

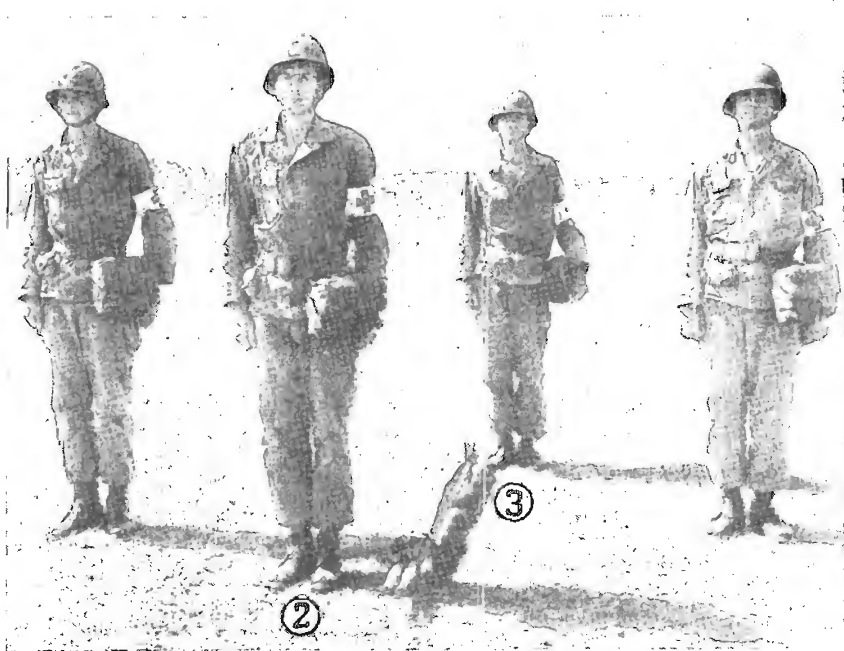


Figure 56. Litter at the ground.

the command **MARCH**, men Nos. 1 and 4 step to the right rear and left front of the litter, respectively, and grasp the handles beside those relinquished by men Nos. 2 and 3. Men Nos. 2 and 3 assume positions vacated by men Nos. 1 and 4, respectively (fig. 57).

*b. Being at the Ground, Closed.* The litter being at the ground, closed, to execute change bearers, bearers change positions as at the carry.

*c. Being at the Ground, Open.* The litter being at the ground, open, to execute the same command, men Nos. 1 and 4 assume the rear and front posts, respectively, while men Nos. 2 and 3 assume right and left posts, respectively, thus all describing part of a circle in a clockwise direction around the litter.

### 38. To Open Litter

Being at the carry, litter strapped, to open litter, the commands are:

1. Open, 2. **LITTER.**

*a. First Step* (fig. 58). At the command **LITTER**, all bearers face the litter.

*b. Second Step* (fig. 59). No. 4 man supports the litter at the center, canvas up. Men Nos. 2 and 3 unfasten straps.

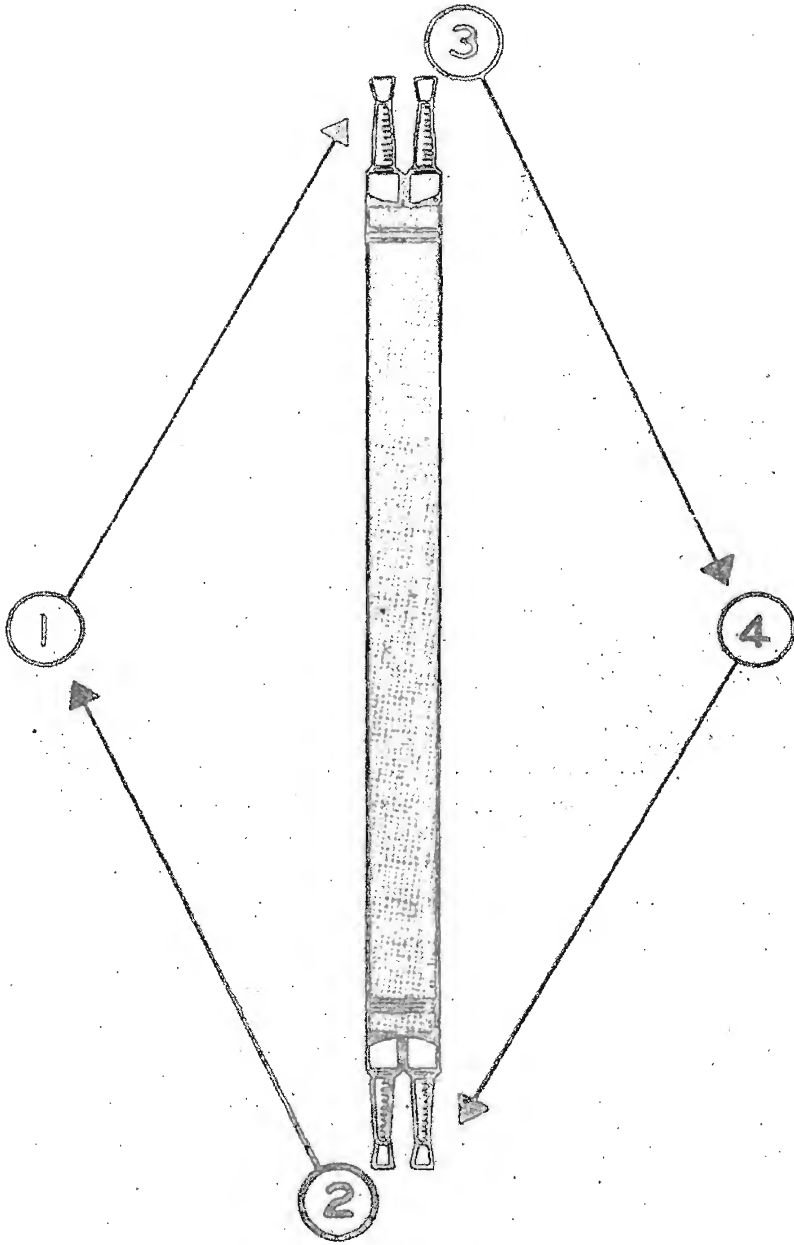
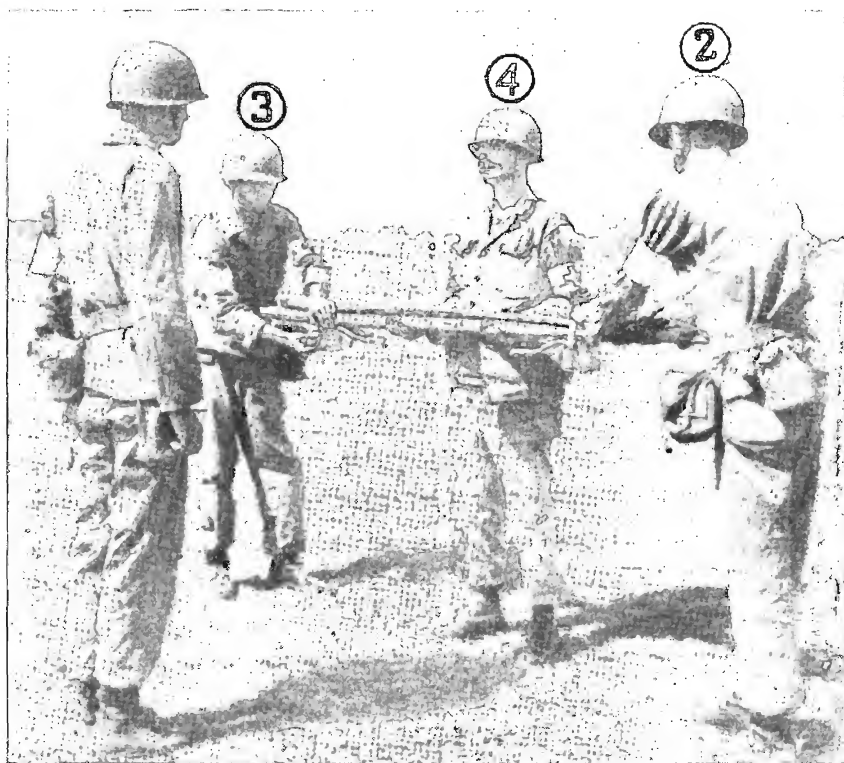


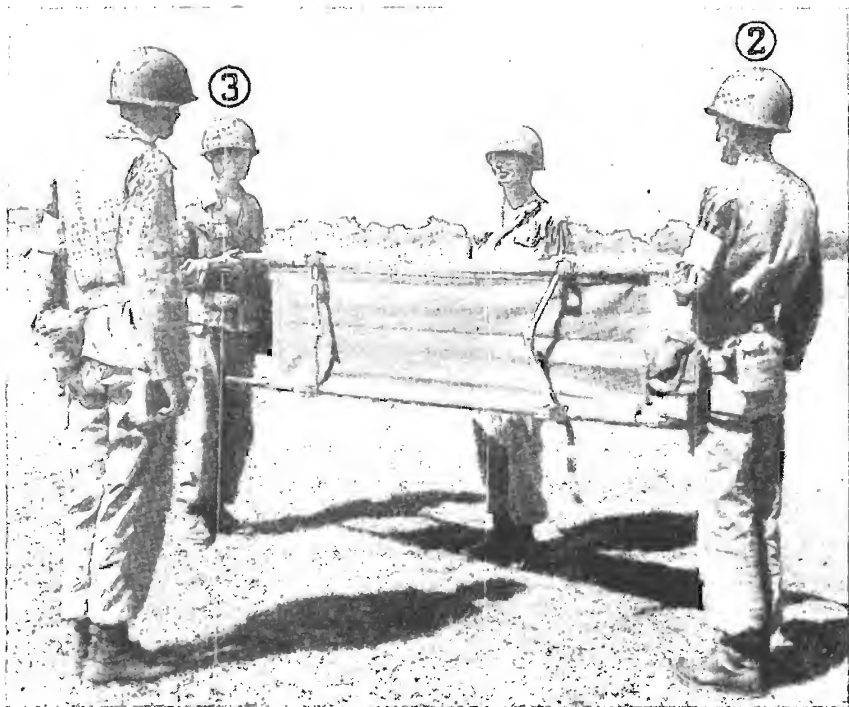
Figure 57. Change bearers, MARCH.



*Figure 58. Open, LITTER; bearers face litter.*



*Figure 59. Open, LITTER; No. 4 man supports the litter while men Nos. 2 and 3 unfasten straps.*



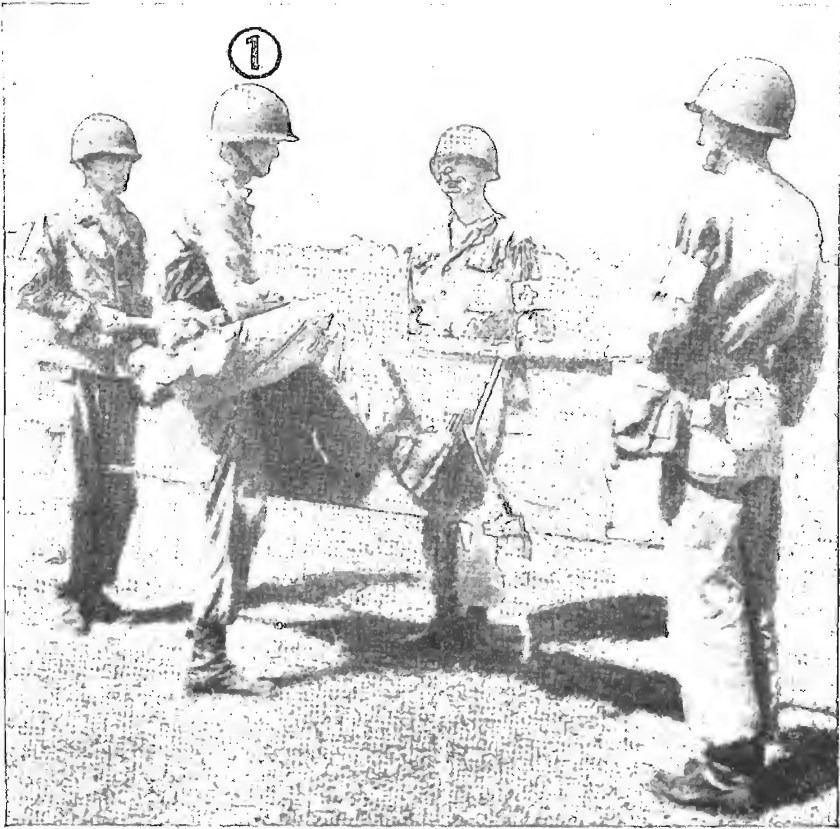
*Figure 60. Open LITTER; men Nos. 2 and 3 grasp left handles with left and right hands, respectively.*

*c. Third Step* (fig. 60). Men Nos. 2 and 3 grasp the left handles with their left and right hands, respectively, leaving the litter suspended longitudinally, canvas to the right.

*d. Fourth Step* (fig. 61). No. 1 man extends the braces by kicking them.

*e. Fifth Step.* Men Nos. 2 and 3 grasp both handles at each end, support the litter horizontally, canvas up, and lower it to the ground. All men return to their positions at litter posts.

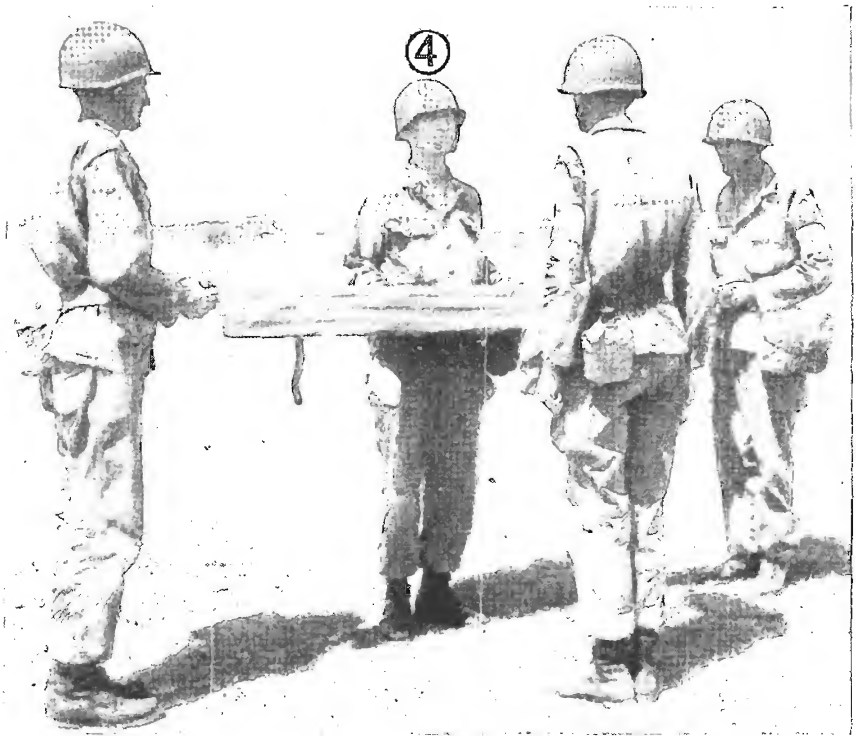




*Figure 61. Open LITTER; No. 1 man extends braces by kicking them.*

### **39. To Close Litter**

Being open, to close litter, the commands are: 1. Close, 2. LITTER. At the command of execution, men Nos. 2 and 3 step outside the right front and left rear handles, respectively, and face inward. They stoop and, with their right hands, raise the litter by the left handles. No. 4 man then collapses the braces by kicking them; men Nos. 2 and 3 raise the lower pole against the upper and bring the litter to the position of carry.



*Figure 62. Strap, LITTER; all men face the litter—No. 4 man supports it at center.*

#### **40. To Strap Litter**

The litter being closed, to strap litter, the commands are: 1. Strap, 2. LITTER.

*a. First Step* (fig. 62). At the command of execution all face the litter. No. 4 man supports the litter at the center.

*b. Second Step* (fig. 63). Men Nos. 2 and 3, assisted by No. 1, fold canvas by doubling it smoothly on top of the poles.

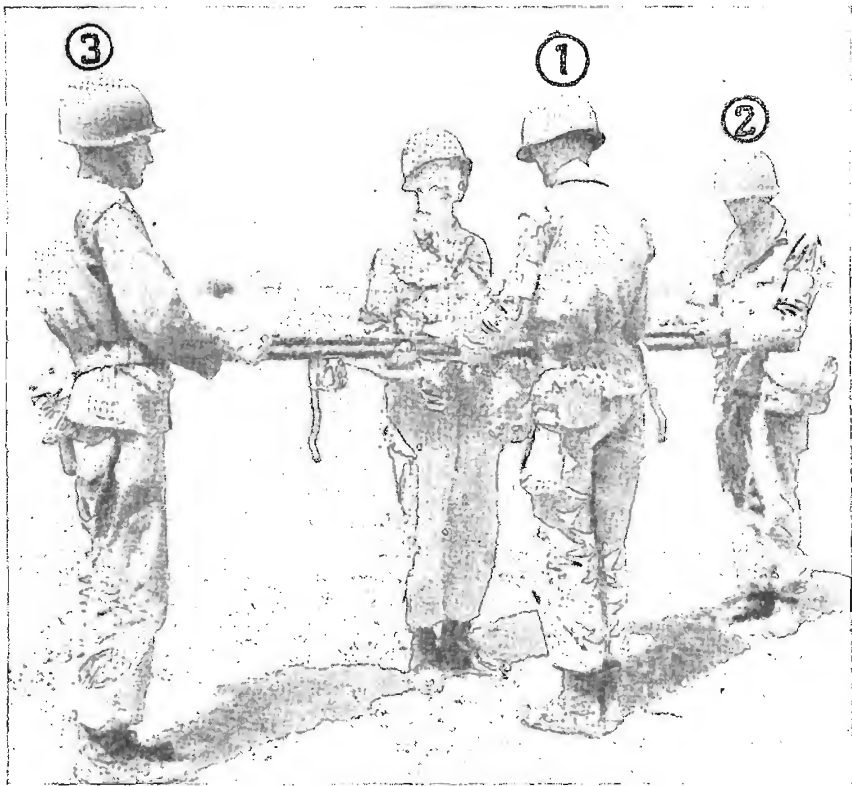
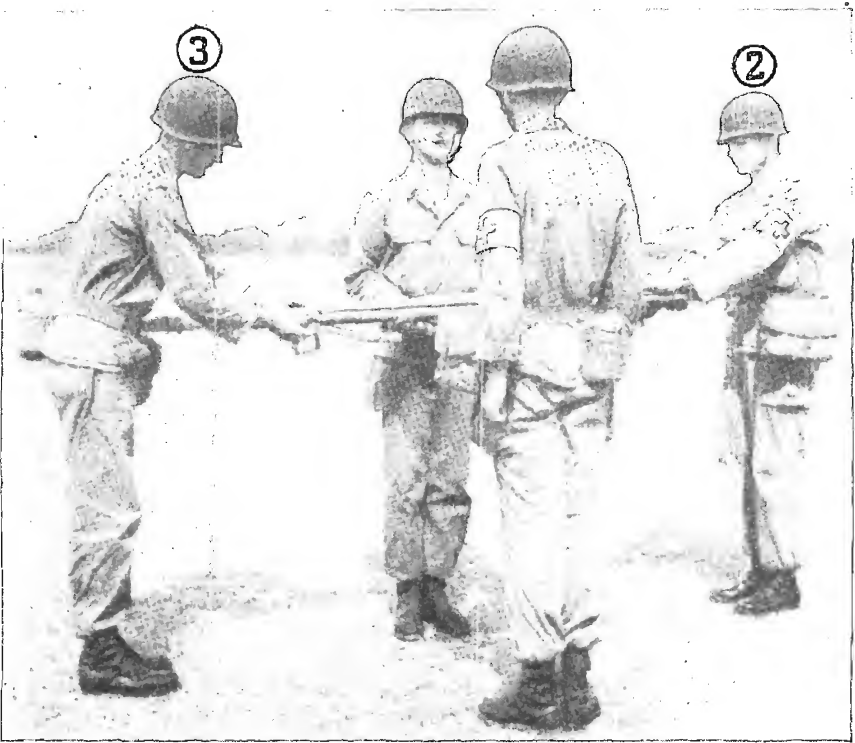


Figure 63. Strap, LITTER; Men Nos. 2 and 3 fold the canvas assisted by No. 1.

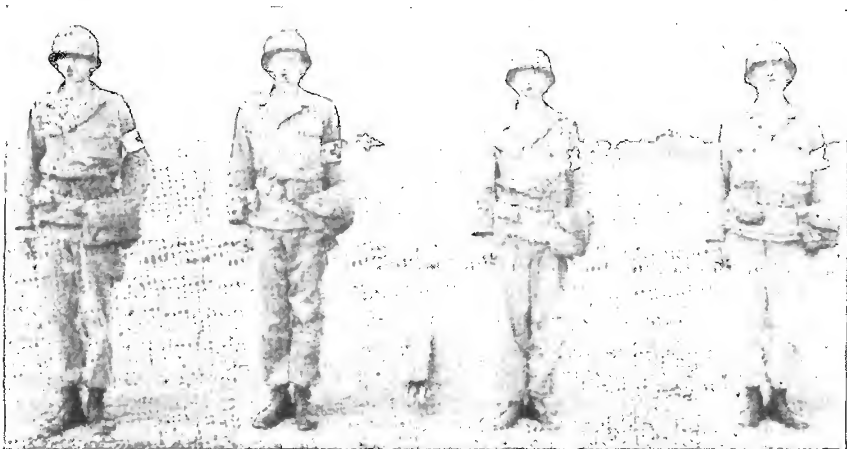
*c. Third Step (fig. 64).* Men Nos. 2 and 3 secure the folded canvas and poles by fastening the cross straps at each end, and all bearers resume their posts at the carry. In the field, the litter should be carried closed and strapped, and opened only upon reaching the casualty. If the litter is open, it may be closed and strapped at the one command, Strap, LITTER, in which case the procedures outlined are both executed in proper order.

#### 41. To Bring Litter Squad Into Line

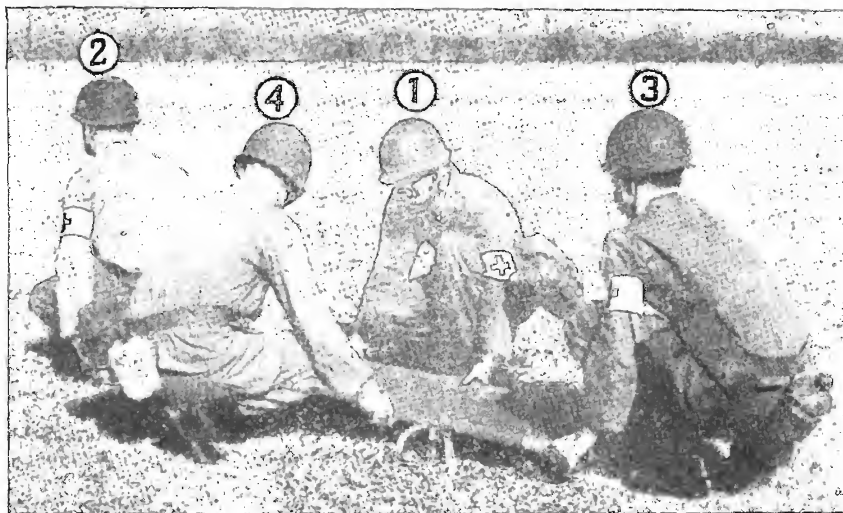
During litter instruction it may be desired to move the squad, without litter, to another point. Bearers being at posts, with litter at the ground, to bring the squad into line, the commands are: 1. Form, 2. RANK. At the command RANK, No. 2 advances one pace and remaining bearers move forward and aline themselves on him, in regular order (fig. 65).



*Figure 64. Strap, LITTER; men Nos. 2 and 3 fasten the cross-straps.*



*Figure 65. Squad in Form, RANK.*



*Figure 66. Squad at prepare to Lift.*

#### **42. To Resume Litter Posts**

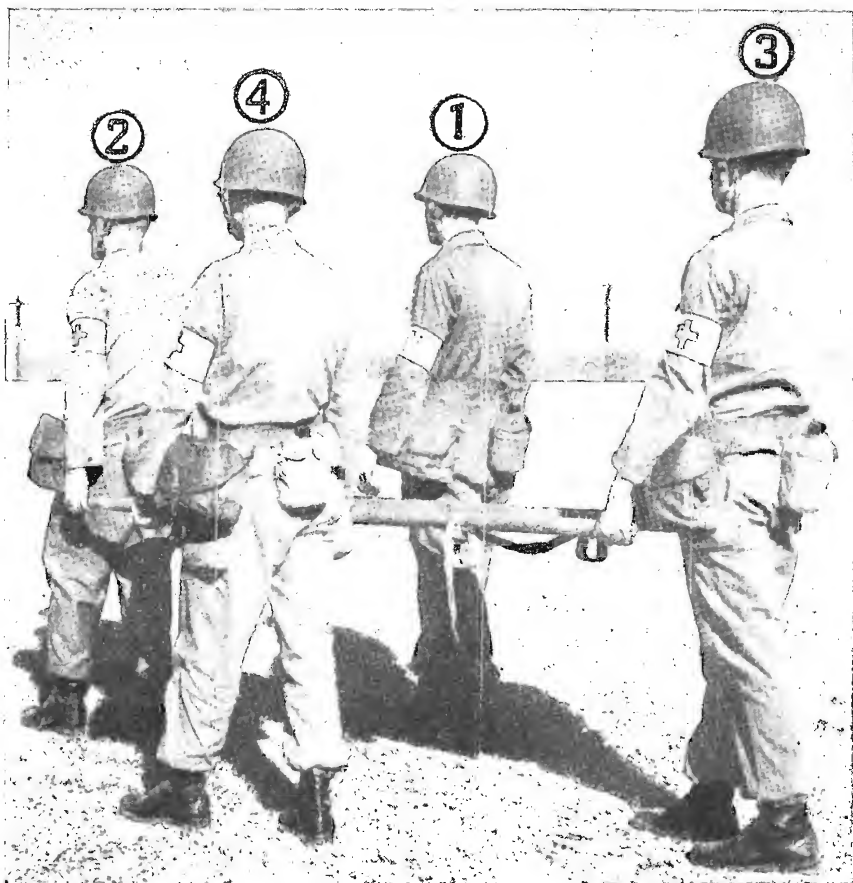
Normal bearer posts, with the litter at the ground, may be resumed at any time by the commands: 1. Litter, 2. POSTS. At the command POSTS, all members of the squad move by the nearest route and resume posts as shown in figure 56.

#### **43. To Lift Open Litter, Loaded or Unloaded**

The litter being at the ground with bearers at litter posts, to lift the litter, the commands are: 1. Prepare to lift, 2. LIFT. At the first command men Nos. 2 and 3 stoop and grasp handles firmly. Meanwhile, men Nos. 1 and 4 face the litter, stoop, and grasp the adjacent pole (fig. 66). At the command LIFT, men Nos. 2 and 3 arise slowly, assisted in lifting by men Nos. 1 and 4 (fig. 67).

#### **44. To Lower Litter**

Being at the lift, to lower litter, the commands are: 1. Lower, 2. LITTER. At the command LITTER men Nos. 2 and 3 slowly lower the litter to the ground and resume the erect position. Both ends of the open litter should be lifted and lowered slowly without jerking; the rear bearers move with the front bearers, keeping the litter horizontal. For purposes of instruction, the unloaded open litter should be handled as a loaded litter. As soon as the men are familiar with the handling of the unloaded litter, instruction should be started using the loaded litter.



*Figure 67. Litter, lifted.*

#### **45. To March Forward**

The litter being at the lift, to march forward, the commands are: 1. Forward, 2. MARCH. At the command MARCH, No. 2 man steps off with the left foot, No. 3 man with the right, both taking short, sliding steps of about 20 inches to avoid jolting and to secure uniform motion of the litter. Men Nos. 1 and 4 step off with the left foot, employing the normal pace at a cadence to conform with the progress of men Nos. 2 and 3.

### **Section V. INSTRUCTION WITH LOADED LITTERS**

#### **46. General**

*a.* For purposes of instruction with loaded litters, certain men are designated "casualties." To make the instruction more realistic and to instruct in the handling of different types of injuries, casualties may

wear moulages, bandages, and splints to simulate actual disabilities. In early periods of instruction these casualties may be placed on the ground at suitable intervals near the line of litters, first with the head and later with the feet toward the litters. As the instruction progresses, the positions may be varied; and, lastly, the casualties may be dispersed or concealed in such positions as they would occupy on the battlefield. When casualties are loaded on litters their equipment is carried by men Nos. 1 and 4 or placed on the litter.

b. Several squads may be instructed simultaneously by one individual, or each squad may be instructed separately by an instructor or by the squad leader (No. 1). Men designated as "casualties" should be frequently rotated with men carrying the litters so that all will get an opportunity to participate in each phase of this instruction.

#### **47. General Rules for Moving Casualties**

a. In moving a casualty either with or without a litter, every movement should be made deliberately and as gently as possible. The command **STEADY** will be used to prevent undue haste and other irregularities.

b. The rear bearers should watch the movements of the front bearers and time their own with them, so as to insure ease and steadiness of action.

c. As a rule, the casualty should be carried on the litter feet foremost, but in going uphill or upstairs his head should be to the front.

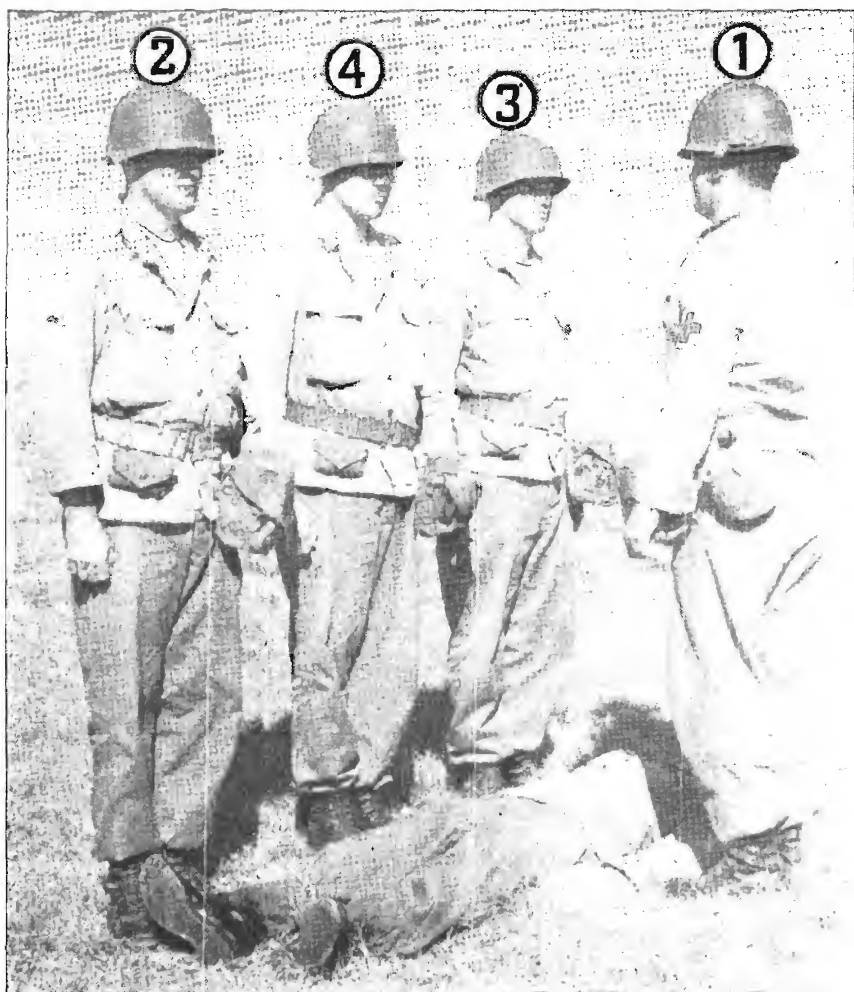
d. In case of fractures of the lower extremities, the casualty is carried uphill or upstairs feet foremost, and downhill head foremost. This prevents the weight of the body pressing upon the injured part.

e. The litter must be kept as nearly level as possible at all times. Care must be taken to do this in passing obstacles and ditches.

#### **48. To Load and Unload Litter**

a. *Position for Lifting Casualty.* The casualty having been located, the general nature of his wounds having been determined, emergency treatment having been given, and a litter being open and available, to place bearers in proper position to lift casualty, the commands are: 1. Right (Left) Side, 2. **POSTS**. At the command **POSTS**, bearers take position as follows: No. 2 man at the right (left) ankle; No. 3 man at the right (left) shoulder; Men Nos. 1 and 4 at the right and left hips, respectively, all facing the casualty (fig. 68).

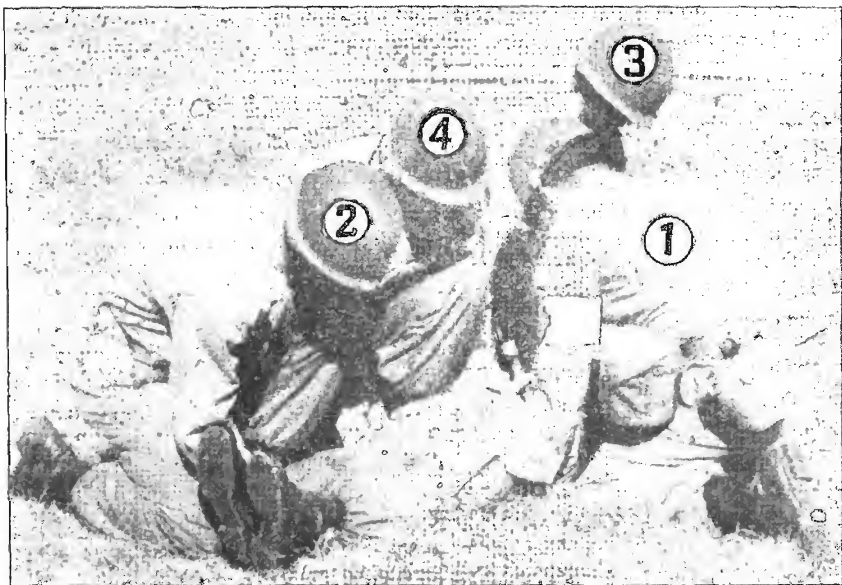
b. *To Lift Casualty and Place Litter in Position.* The bearer being at posts, to lift casualty preparatory to placing him on the litter, the commands are: 1. Lift, 2. **PATIENT**. At the preparatory command "Lift," all bearers kneel on the knee nearest the casualty's feet; No. 2 man passes his forearms under the casualty's legs, carefully supporting the fracture, if there is one; men Nos. 1 and 4 place their arms under



*Figure 68. Squad at Right Side, POSTS.*

the small of the casualty's back and thighs, not locking hands; No. 3 man passes one hand under the casualty's neck to the farther armpit, with the other supporting the nearest shoulder (fig. 69). At the command **PATIENT**, all lift together, slowly and carefully, and place the casualty upon the knees of the three bearers on the same side (fig. 70). As soon as the casualty is firmly supported there, the bearer on the opposite side (No. 1) relinquishes his hold, proceeds quickly by the nearest route to the litter which he takes and, returning rapidly, places it under the casualty and against the ankles of the other three bearers (fig. 71).





*Figure 69. Squad at LIFT.*



*Figure 70. First step after command PATIENT.*

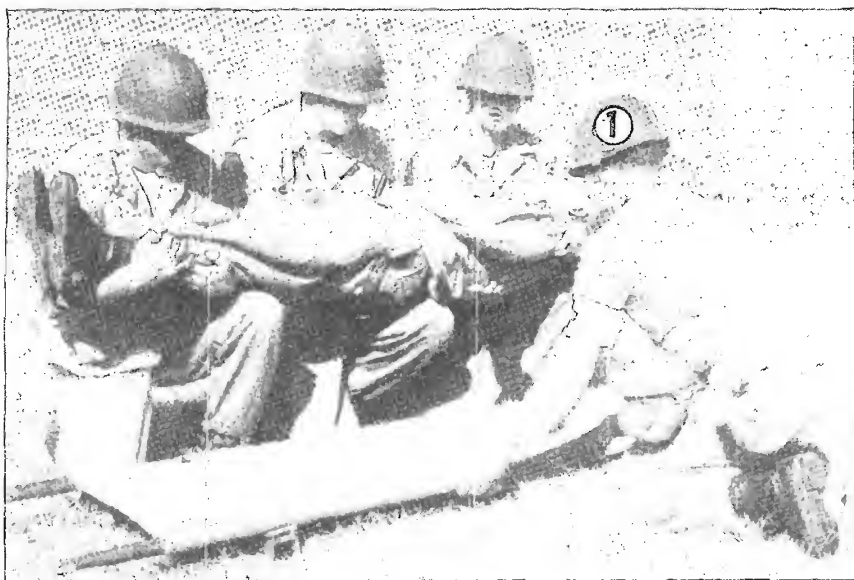


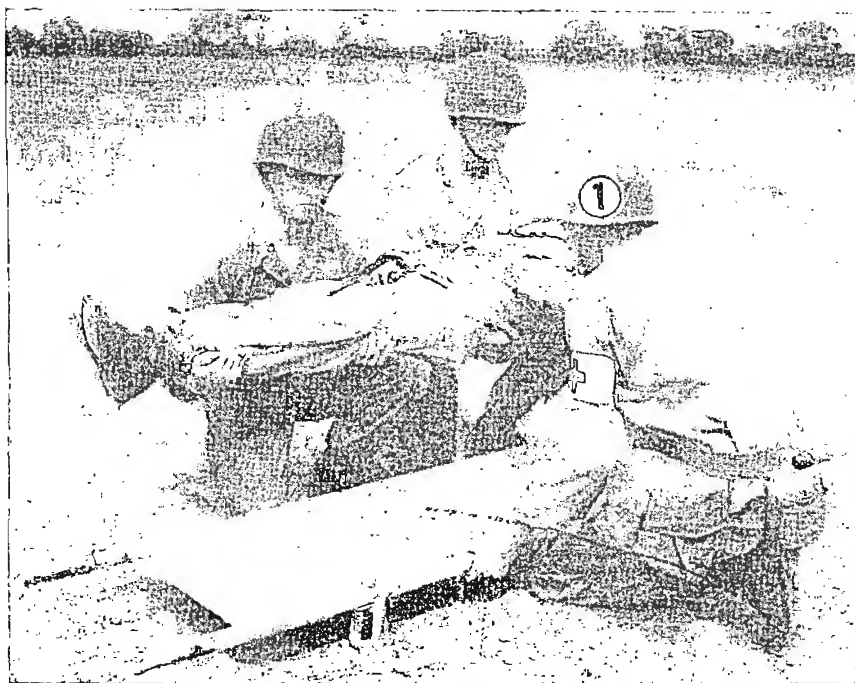
Figure 71. Litter placed beneath casualty.

*c. To Lower Casualty on Litter.* The casualty being on the knees of three bearers, and the litter being in proper position to receive the casualty, to lower casualty on litter the commands are: 1. Lower, 2. PATIENT. At the command "Lower," the free bearer (No. 1) resumes his former kneeling position opposite the other three bearers and prepares to assist in lowering the casualty. At the command PATIENT, the casualty is lowered gently upon the litter and made as comfortable as possible; then, without further orders, all bearers rise and resume their positions at litter posts.

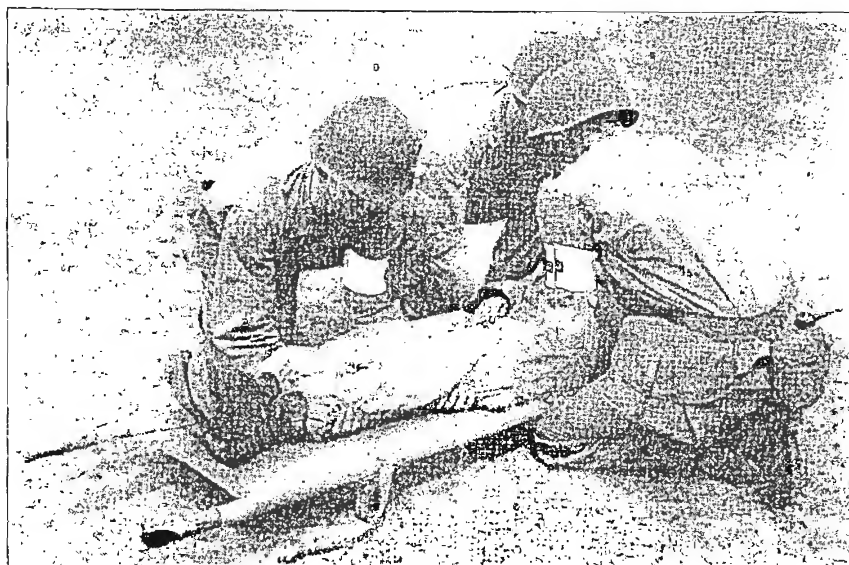
*d. To Unload Litter.* The casualty being on the litter, to unload litter, the same commands are given and the actions of the bearers are the same, with the following exception: after the casualty has been lifted to the knees of the three bearers, the free bearer removes the litter from beneath the casualty instead of placing it under him.

#### **49. To Load and Unload Litter With Three Bearers**

In the absence of one man from the litter squad, No. 2 or 3 man is replaced by No. 4. With three bearers, the litter is placed as usual and, at the prescribed commands, the bearers take their proper positions. Having been lifted by the three bearers, the casualty is supported on the knees of the two on one side, while the third (No. 1) places the litter in position (fig. 72). In like manner, the casualty is lowered on the litter (fig. 73). To unload the litter, the procedure is reversed.



*Figure 72. Loading litter with three bearers.*



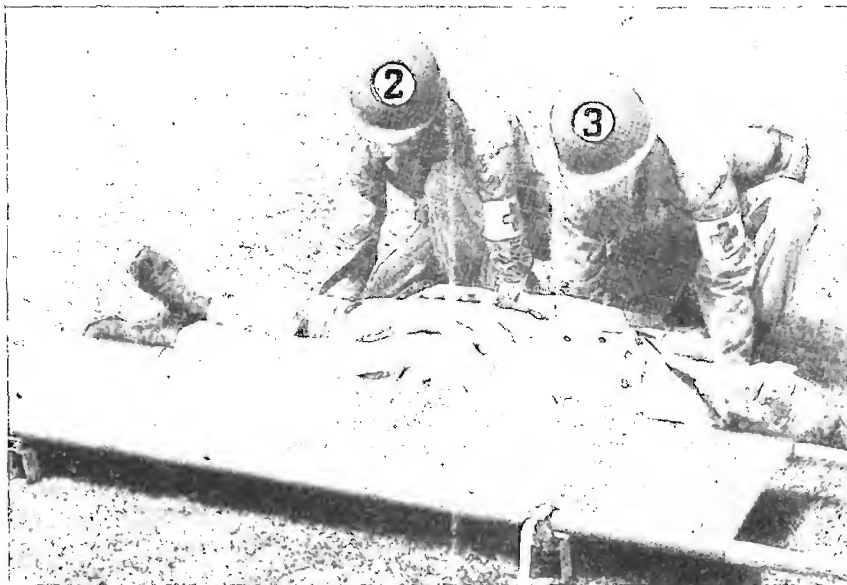
*Figure 73. Lowering casualty on litter ((three bearers)).*



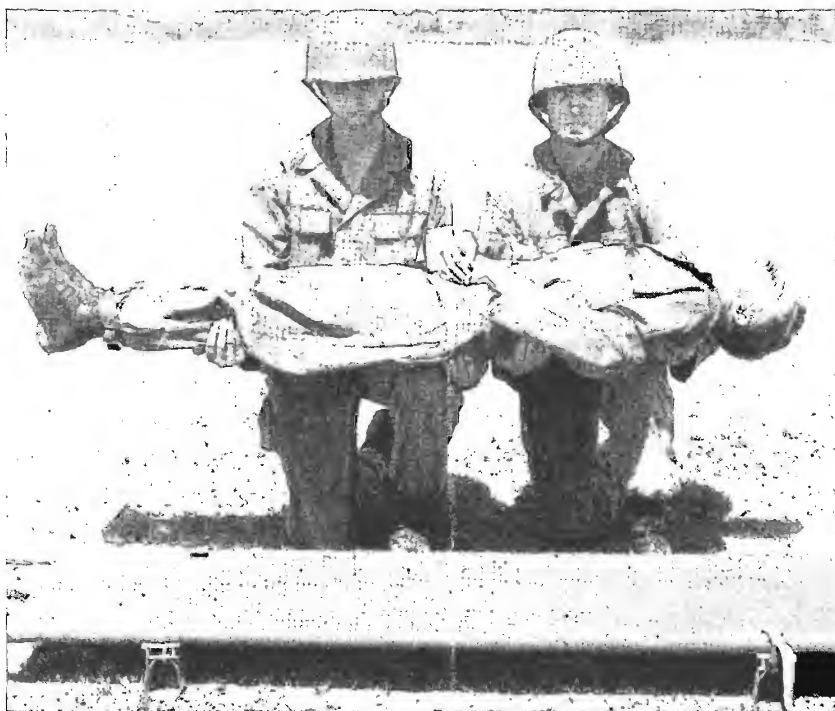
Figure 74. Two bearers at Right Side, POSTS.

#### 50. To Load Litter With Two Bearers

*a. With Bearers on the Same Side.* At the command Right (Left) Side, POSTS, men Nos. 2 and 3 take positions at casualty's right (left) thigh and shoulder, respectively (fig. 74). At the command LIFT, bearers kneel on the knee nearest the casualty's feet; No. 2 man passes his arms beneath the casualty's hips and knees; No. 3 man passes his arms beneath the casualty's shoulders and small of his back (fig. 75). At the command PATIENT, they lift together, raising the casualty upon their knees; then, readjusting their holds, they rise to their feet and carry the casualty to the side of the litter. At the command Lower, PATIENT, the bearers kneel and place the casualty on their knees (fig. 76), stoop forward and place him on the litter



*Figure 75. Actions of two bearers at LIFT.*



*Figure 76. Two bearers at the command Lower, PATIENT.*

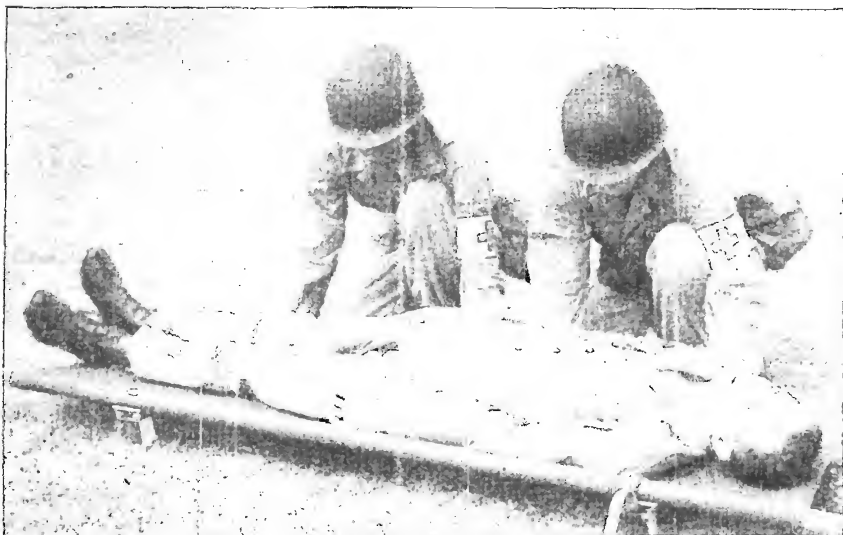


Figure 77. Two bearers placing casualty on a litter.

(fig. 77), then rise and assume the position of Litter, POSTS, without command. To unload, posts are taken in the same way, at the proper commands.

*b. With Bearers on Opposite Sides.* If the casualty is conscious and able to cooperate in the movement, the bearers take positions on opposite sides of the casualty. To carry out this movement the commands are: 1. Both Sides, 2. POSTS. At the command POSTS, men Nos. 2 and 3 take positions at the casualty's right and left hips, respectively, facing the casualty (fig. 78). At the command LIFT, bearers kneel on the knee nearest the casualty's feet, raise him to a sitting position, and pass their arms around his back and under his thighs, locking hands. The casualty, if able, clasps his arms around the bearers' necks (fig. 79). At the command PATIENT, they lift the casualty, both rising together, and carry him to the center of the litter (fig. 80). At the command Lower, PATIENT, they stoop and lower the casualty upon the litter in a sitting position, and the casualty releases his hold on the bearers' necks (fig. 81). Both bearers then assist the casualty to lie down upon the litter after which both bearers take the position of Litter, POSTS, without command. Unloading is performed in reverse order, at the proper commands.



*Figure 78. Two bearers at Both Sides, POSTS.*



*Figure 79. Two bearers ready to lift casualty.*





*Figure 80. Two bearers ready to lower casualty.*



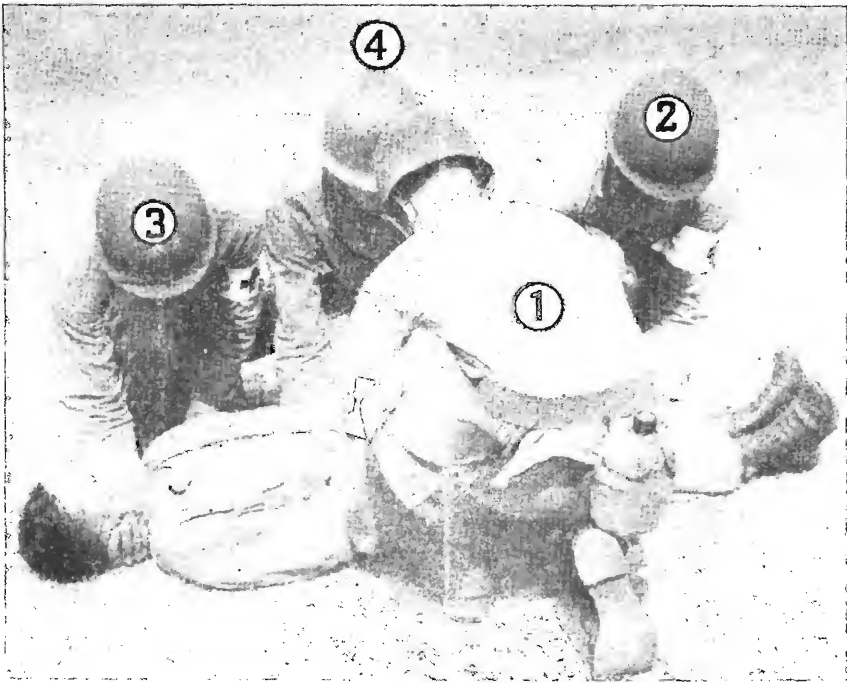
*Figure 81. Bearers depositing casualty on litter.*

#### **51. To Load and Unload Casualties With Back Injuries**

To avoid aggravating the condition of casualties with actual or suspected back injuries, the following procedure will be followed:

a. The No. 1 man places a blanket, coat, or jacket, arranged in a firm roll or fold about 2 feet long and 6 inches in diameter on the litter in a position to support the arch of the casualty's back. To lift the casualty on the litter, the No. 3 man places his hands under the casualty's shoulders and controls his head; the No. 4 man places his hands under the small of the back and buttocks; and the No. 2 man places his hands under the thighs and calves; No. 1 man assists the No. 4 man at the small of the casualty's back. All men kneel on the knee nearest the casualty's feet.

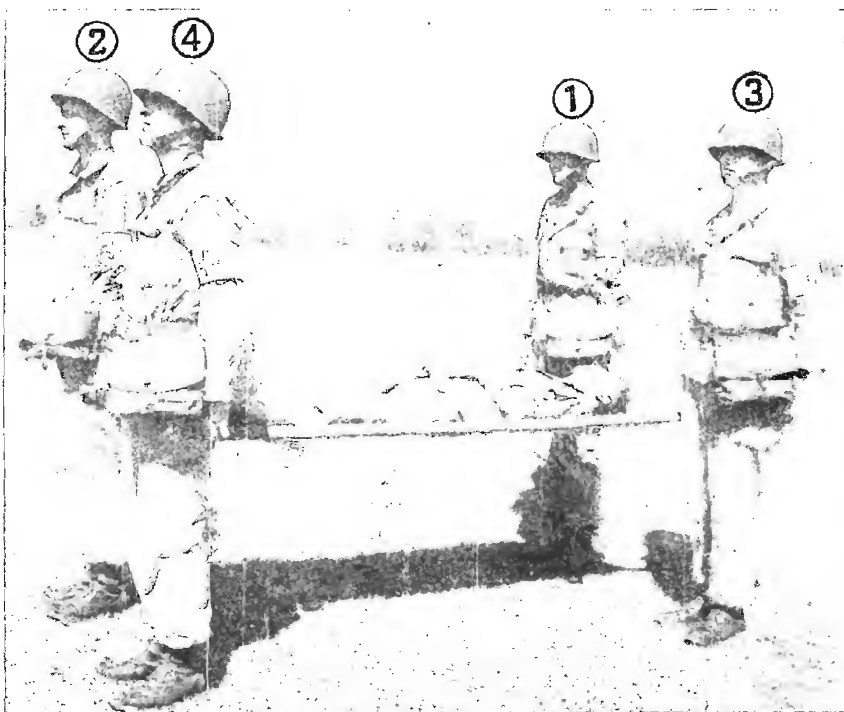
b. At the command **Lift, PATIENT**, all men gently lift the casualty off the ground about 8 inches. The No. 1 man procures the litter and places it under the casualty. He also adjusts the roll on the litter under the casualty's back. At the command **Lower, PATIENT**, the three bearers lean forward and lower the casualty to the litter, with the aid of the No. 1 man (figs. 82 and 83). In certain cases it may be necessary to tie the hands of the casualty in front of him before placing him on the litter, in order to prevent injury to his arms if he is unable to hold them on the litter.



*Figure 82. Lifting casualty with a broken back.*



*Figure 83. Casualty with broken back on litter.*



*Figure 84. Loaded litter carried by four bearers.*

## **52. To Carry Loaded Litter by Four Bearers**

If it is desired that the four bearers carry the loaded litter while marching, the commands are: 1. By Four, 2. Carry, 3. LITTER. At the command LITTER, No. 1 man steps backward to the right rear, No. 4 man steps forward to the left front, and each grasps the handle nearest him, relinquished by men Nos. 2 and 3, who, retaining their grasp on the other handles, move to one side (fig. 84). Normal positions are resumed by the command Litter, POSTS.

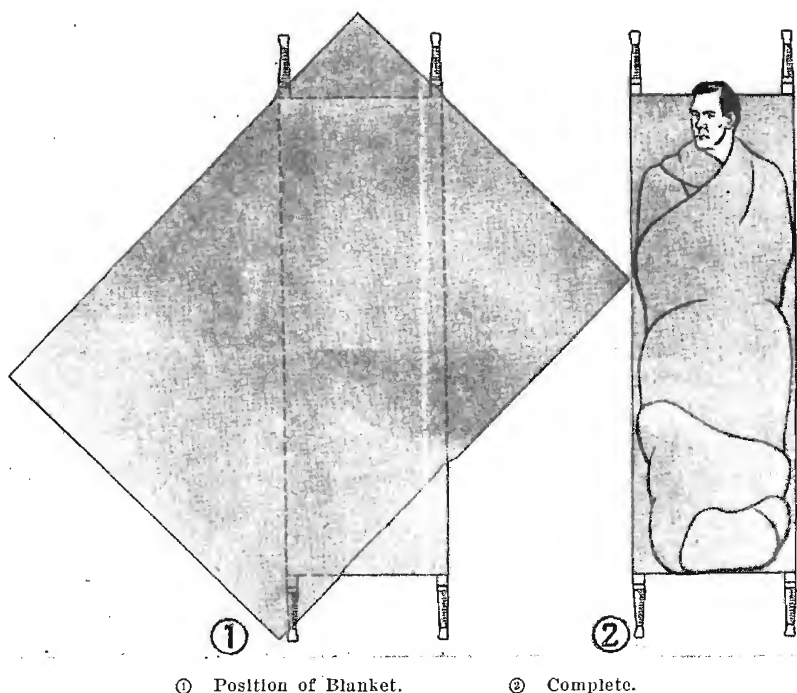
## **Section VI. DRESSING THE LITTER**

### **53. General**

In cold weather it will be desirable to dress the litter with one or more blankets prior to moving the casualty in order to afford him warmth and comfort during transport and to reduce the danger of shock. One, two, or three blankets may be used to dress the litter.

### **54. Dressing Litter With One Blanket**

To dress the litter with one blanket, place the blanket diagonally over the litter (1, fig. 85). Place casualty on the blanket, wrap the sides about his body, and tuck in at the head and feet (2, fig. 85).



① Position of Blanket.

② Complete.

Figure 85. Dressing litter with one blanket.

## 55. Dressing Litter With Two Blankets

To dress the litter using two blankets:

*a.* Place the first blanket lengthwise across the litter with the blanket edge close to or just beyond the head end of the litter (1, fig. 86).

*b.* Fold the second blanket in thirds, lengthwise, and place over the first, the upper edge of this folded blanket being about 10 inches below the upper edge of the first blanket. The exact position of the second blanket depends upon the height of the casualty, it being placed lower on the litter for taller men. Open the folds of the second blanket for about 2 feet at the foot end (2, fig. 86).

*c.* To wrap the casualty, place him in position on the second blanket. Bring the bottom of the blanket up over the casualty's feet, with a small fold between the feet. Tuck the two open folds closely over and around the feet and ankles (3, fig. 86). Finally, wrap first one and then the opposite side of the first blanket over the casualty (4, fig. 86).

## 56. Dressing Litter With Three Blankets

To dress the litter using three blankets, proceed as follows:

*a.* Place the first blanket on the litter lengthwise so that one edge corresponds with the outer (or far) pole of the litter and the upper

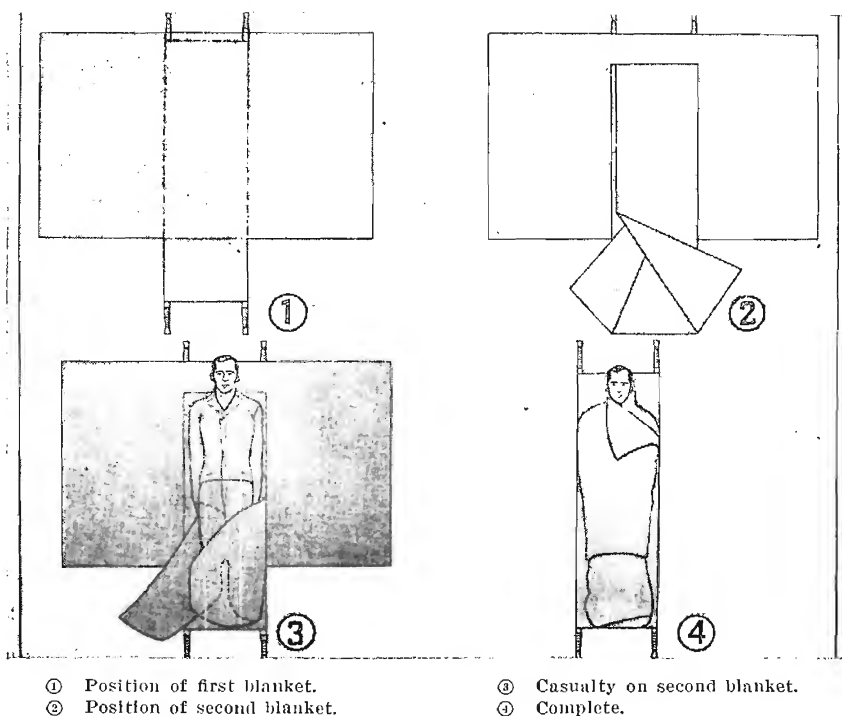


Figure 86. Dressing the litter with two blankets.

edge is even with the head of the canvas. Fold the blanket back upon itself once so that the folded edge is along the inside pole of the litter and the outer edge overhangs the outside pole (1, fig. 87).

b. Place the second blanket lengthwise on the first so that one edge corresponds with the inner pole of the litter and the upper edge is again even with the head end of the canvas. Then fold the blanket back upon itself so that the folded edge is along the outside pole of the litter and the other edge overhangs the inside pole (2, fig. 87).

c. After placing the casualty on the litter, fold the third blanket once lengthwise and place it over the casualty, one end under his chin (3, fig. 87). Then fold the free or overhanging edges of the first two blankets over the third and secure in place with safety pins or litter securing straps (see par. 74) (4, fig. 87). This method of dressing the litter gives four thicknesses of blankets over and under the casualty, thus giving additional warmth and thereby assisting in the prevention of shock.

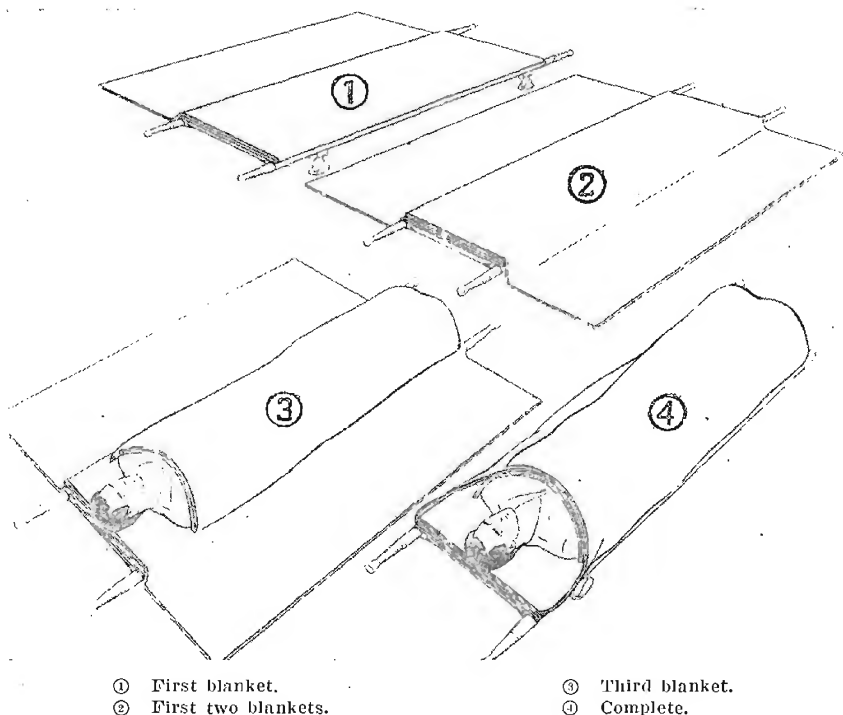


Figure 87. Dressing litter with three blankets.

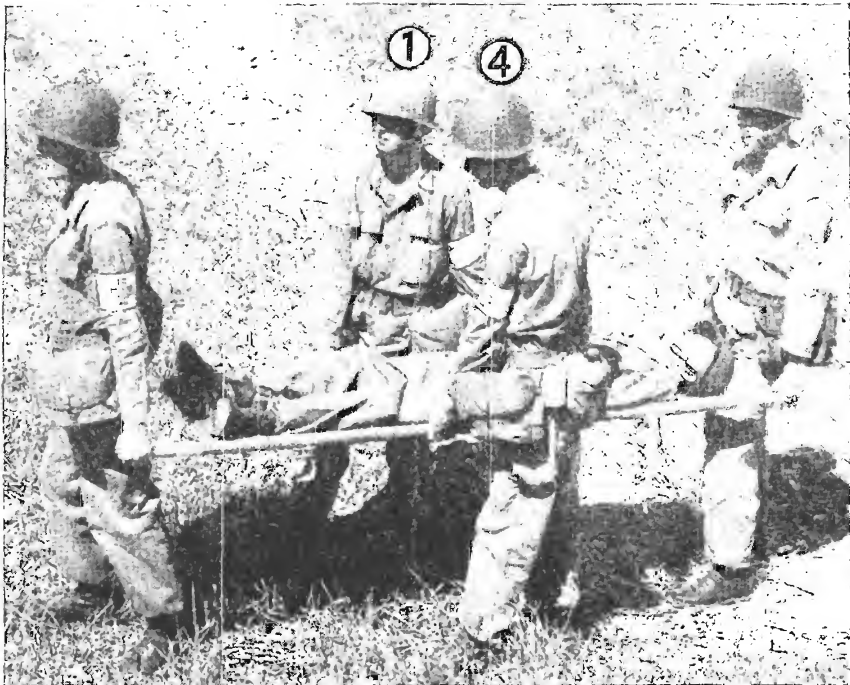
## Section VII. LITTER OBSTACLES

### 57. General

Obstacles include fences, hills, walls, ditches, running streams, or other natural or artificial impediments. Obstacles should be avoided when feasible, otherwise they must be surmounted. Orders for surmounting separate obstacles are neither necessary nor feasible. Hence, flexibility in the execution of orders concerning obstacles must be maintained, common sense dictating details of action most suited to the situation with which the bearers may be confronted.

### 58. Litter Obstacle Course

A litter obstacle course may be constructed to simulate most of the natural and artificial obstructions that litter bearers are likely to meet. Such a course is not only useful in presenting obstacles of all kinds and teaching the proper methods of surmounting them, but also in conditioning bearers physically for the arduous tasks they will encounter in combat. Where construction of a litter obstacle course is impracticable, many of the obstacles can be simulated from existing facilities.



*Figure 88. Carrying litter over minor obstacles (rough terrain).*

#### **59. To Pass Minor Obstacles**

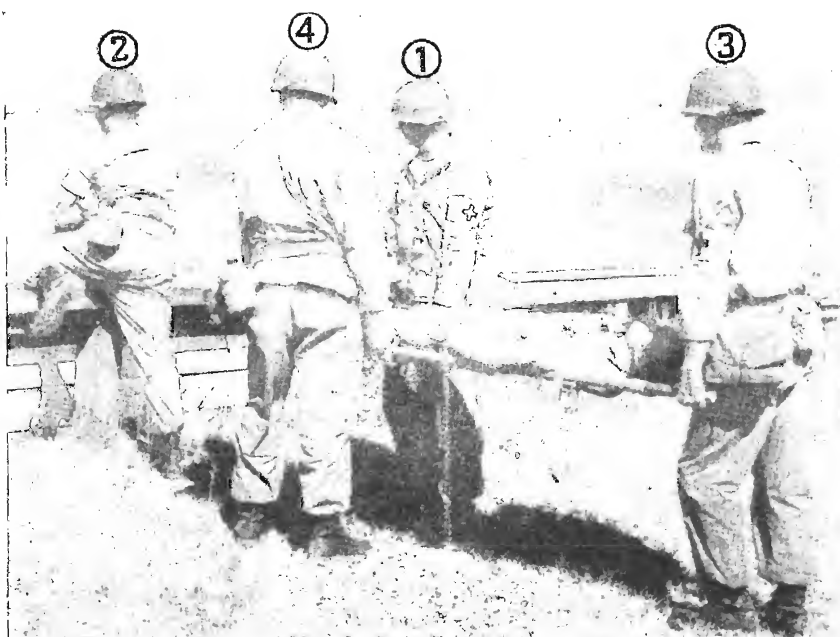
To cross wide, shallow streams, rough or cultivated ground, or similar obstacles, men Nos. 1 and 4 close in, grasp the centers of the adjacent poles and give support until the obstacle has been passed (fig. 88).

#### **60. To Pass Major Obstacles**

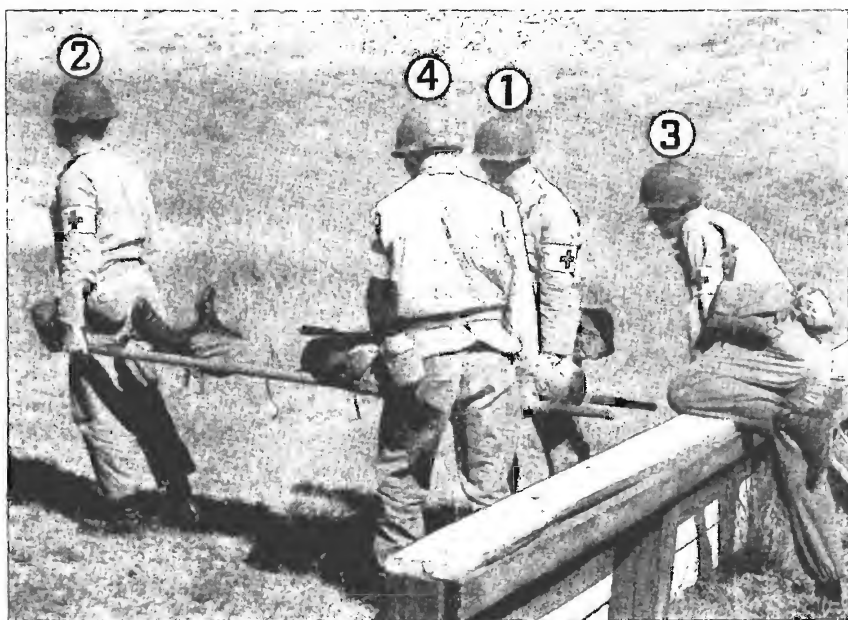
*a.* To pass over fences, ditches, and similar obstacles, men Nos. 1 and 4 close in and grasp the centers of the adjacent poles. No. 2 man then relinquishes his grasp of the front handles and steps over the obstacle (fig. 89). The other three bearers then advance the litter until No. 2 man can resume his grasp of the front handles. Men Nos. 2 and 3 support the litter by the front and rear handles, respectively, while men Nos. 1 and 4 step across the obstacle. Having passed the obstacle, men Nos. 1 and 4 again grasp the litter at the center. No. 3 man then releases his hold of the rear handles and steps across the obstacle (fig. 90). Having crossed, he again grasps the rear handles and men Nos. 1 and 4 return to their posts.

*b.* When a major obstacle is of such length that the procedure described in *a* above is impossible, men Nos. 1 and 4 close in and grasp the sides of the litter. All four bearers then proceed, making their way over the obstacle and supporting the litter together (fig. 91).

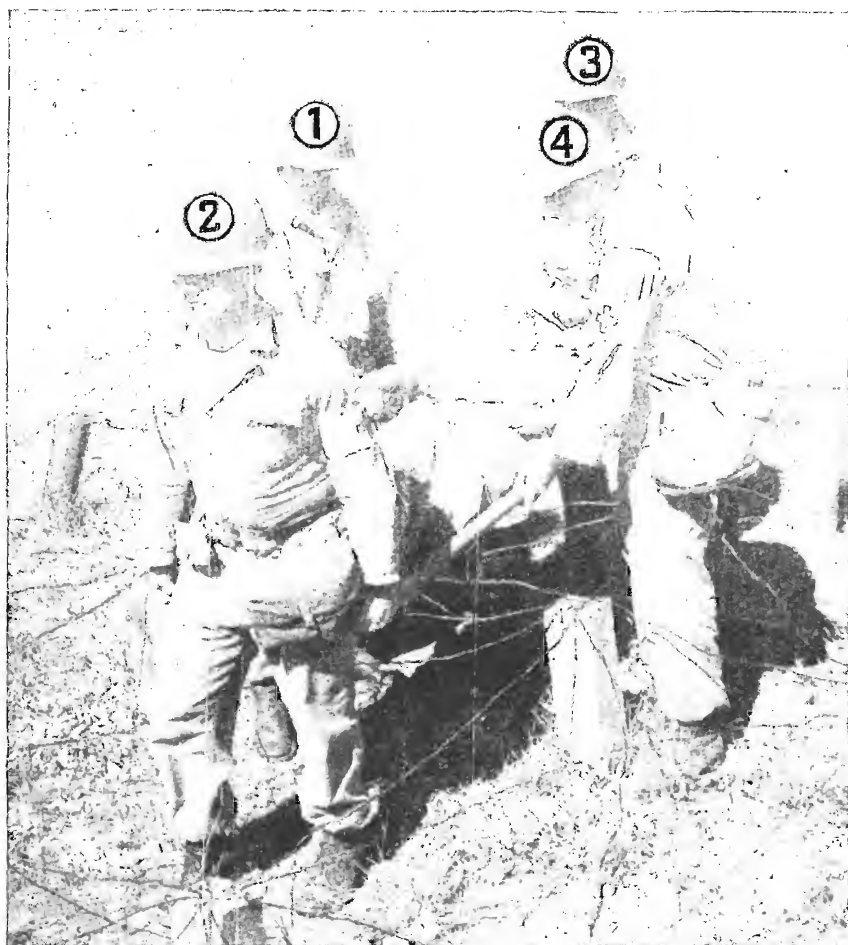




*Figure 89. Major obstacle (low hurdle); first step.*



*Figure 90. Passing major obstacle; second step.*



*Figure 91. Passing major obstacle, four bearers supporting litter.*

c. When a long litter carry involving a series of major obstacles must be negotiated, six men should be employed if they are available. The four regular bearers being in the normal position as shown in figure 84, the two additional bearers grasp adjacent litter poles at the center and all advance, supporting the litter whenever an obstacle of sufficient difficulty is encountered.

#### **61. To Surmount Obstacles Over 5 Feet High**

The squad being in normal position as shown in figure 84, to surmount an obstacle over 5 feet high, the litter is raised carefully to the level of the obstacle and advanced until the front of the litter has cleared or has become well anchored on the obstacle. Men Nos. 2 and 4 then clear the obstacle, assist in advancing the litter to the rear stirrup

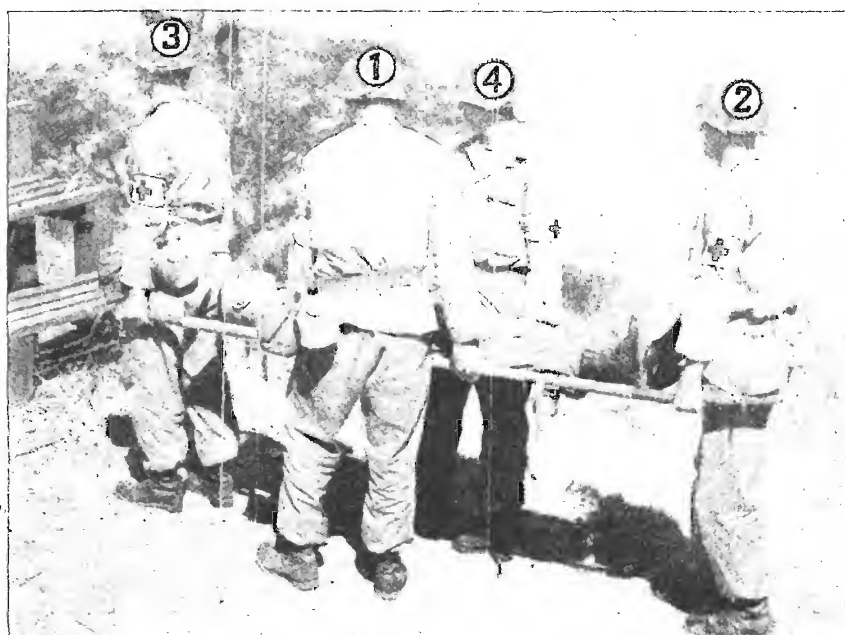


Figure 92. *Upstairs carry; first step. Litter turned around so that head of casualty is toward stairs.*

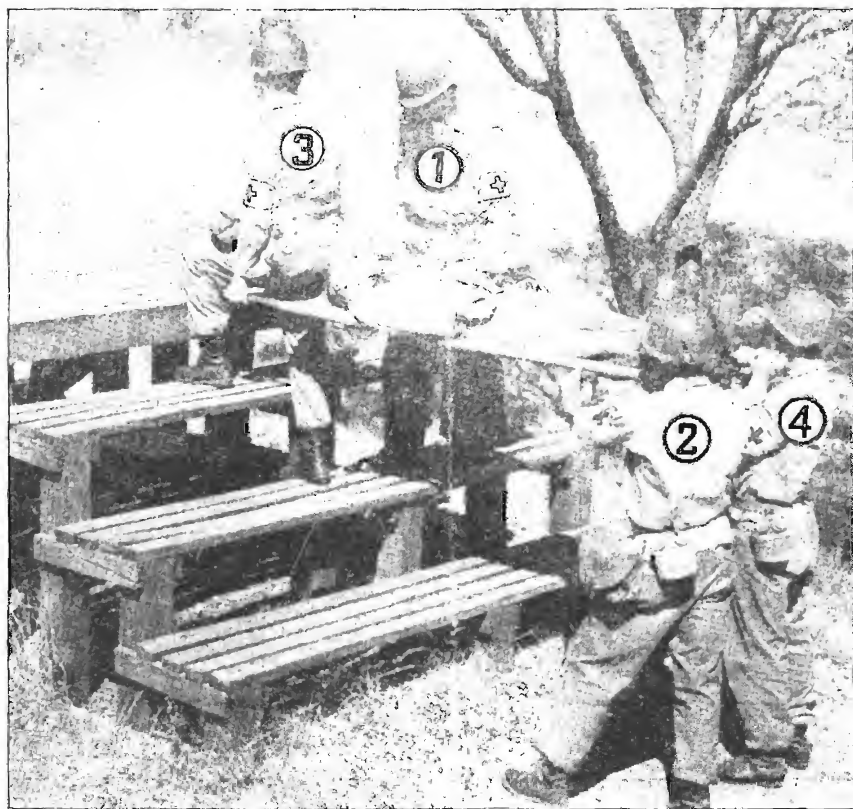
and then steady it, while men Nos. 1 and 3 clear the obstacle and again grasp the rear handles. Upon clearing the obstacle, the litter is lowered to its former level.

## 62. To Carry Loaded Litter Upstairs and Downstairs

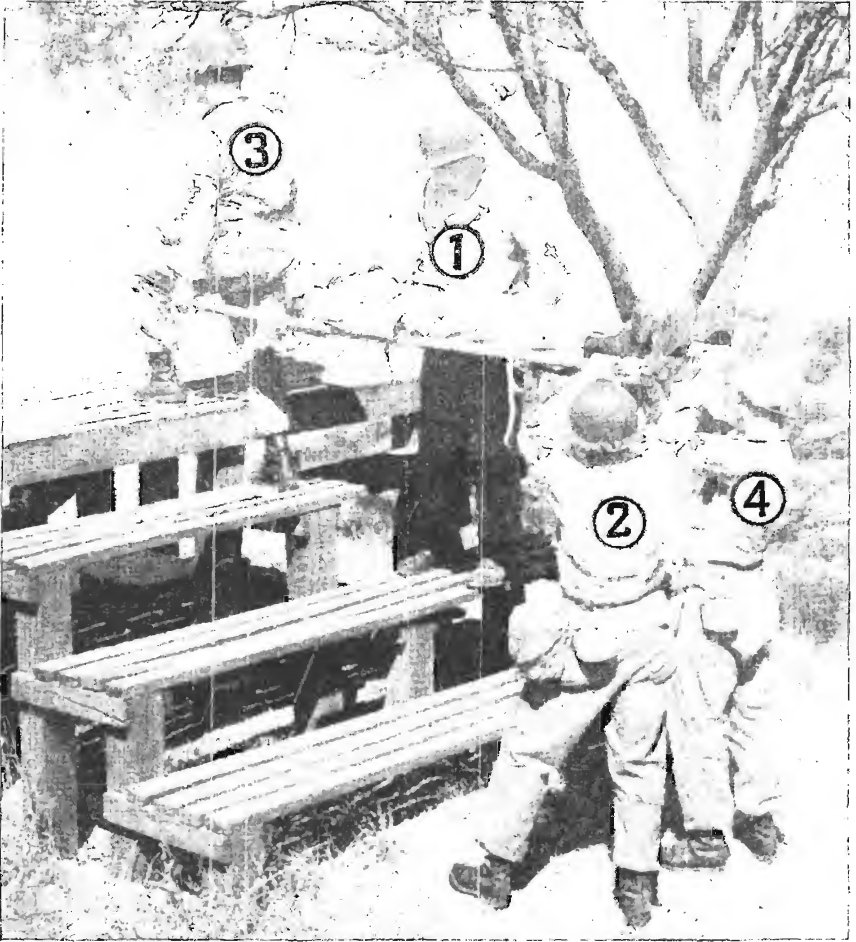
*a. Upstairs Carry.* Normally, a loaded litter is carried upstairs head first (par. 47c). The litter is carried to the foot of the stairs in the usual manner, wheeled about, and halted (fig. 92). To negotiate the stairs, men Nos. 1 and 4 grasp the litter at the centers of the poles. Men Nos. 2 and 3 then relinquish their grasps, face about (fig. 93), and resume hold of the handles. No. 4 man then steps to the handle nearest him at the foot of the litter and grasps it while No. 2 man grasps the opposite rear handle. No. 1 man meanwhile lets go of the litter and advances part way up the stairs (fig. 94); men Nos. 2, 3, and 4 now carry the litter up the stairs, the rear bearers being responsible for maintaining the litter level while No. 1 man renders whatever assistance he can (fig. 95). When only three bearers are present, the litter must be placed on the ground while the bearers change position at the foot of the stairs. After mounting the stairs, normal positions are resumed.



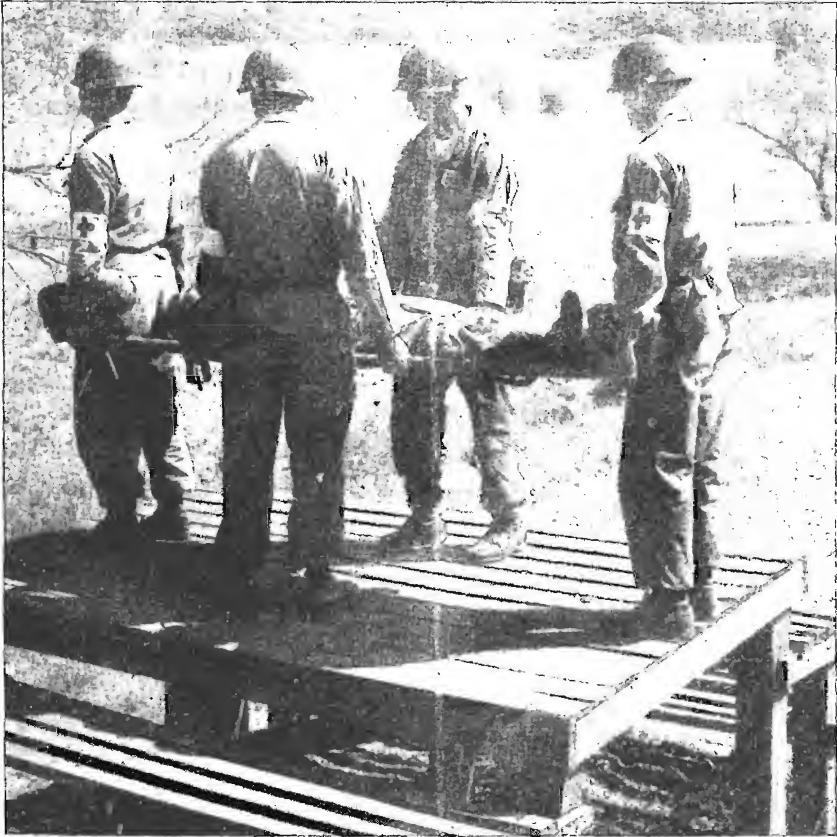
*Figure 93. Upstairs carry; second step. Litter bearers face toward stairs.*



*Figure 94. Upstairs carry; third step. No. 1 man advances part way upstairs.  
No. 4 man aids No. 2 man at rear of litter.*



*Figure 95. Upstairs carry; fourth step. Men Nos. 2, 3, and 4 carry litter while No. 1 assists.*



*Figure 96. Downstairs carry; turning litter into feet first position for descent.*

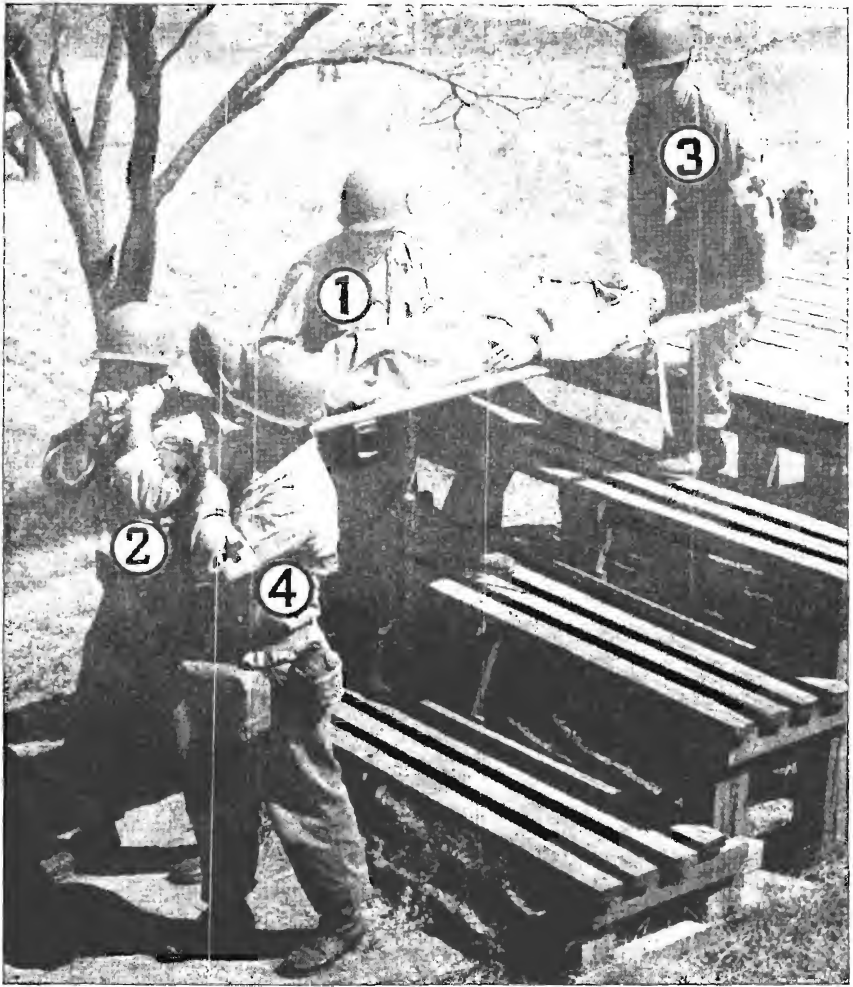


Figure 97. Downstairs carry; No. 1 man assists.

*b. Downstairs Carry.* Normally a loaded litter is carried downstairs feet first (par. 47c); thus, when upstairs and downstairs obstacles are combined, the litter, whenever possible, should be wheeled about at the top of the obstacle prior to descent (fig. 96). To descend the stairs, No. 4 man grasps the left front handle and No. 2 man the right front. No. 3 man maintains hold of the rear handles and, assisted by No. 1 man, is responsible for maintaining the litter level during the descent (fig. 97). Having reached the foot of the stairs, bearers resume the position of Litter, POSTS (fig. 98).



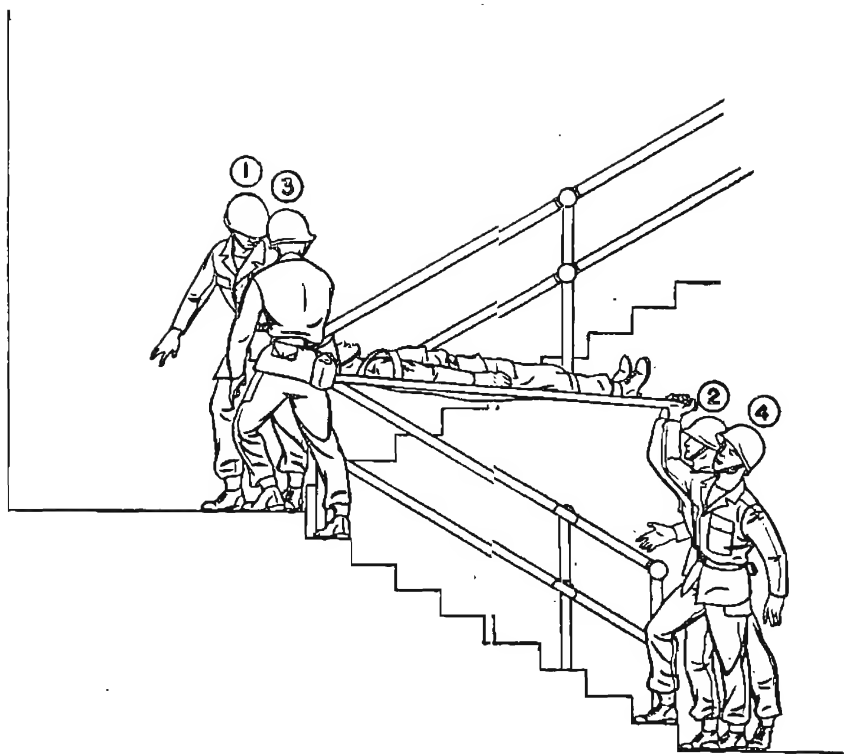


Figure 98. Downstairs carry completed. Bearers at litter, POSTS.

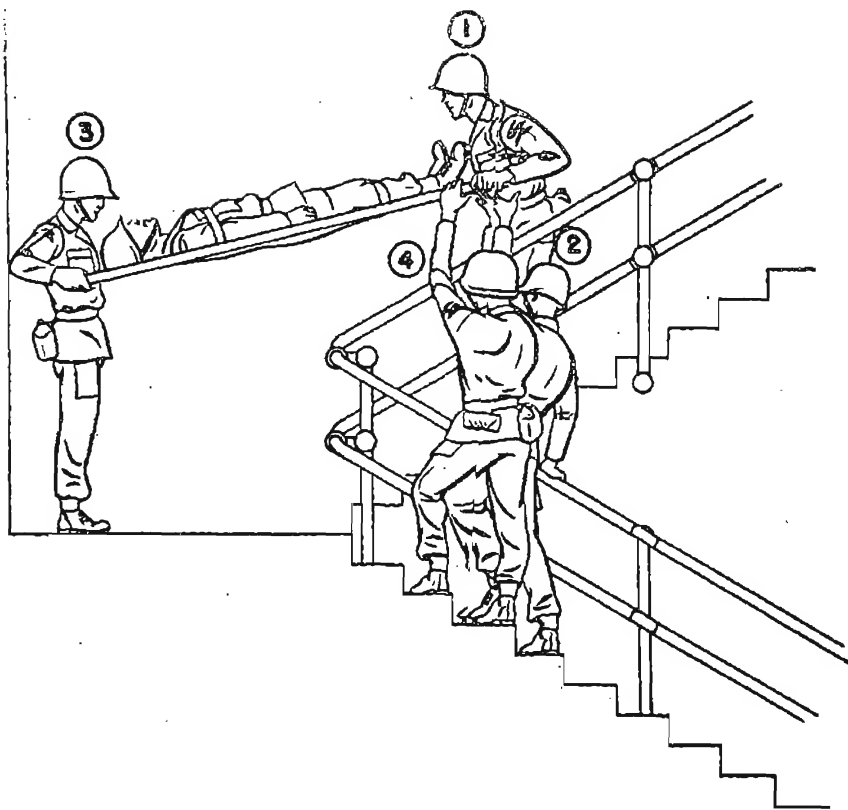
*c. Carrying Casualties With Leg Fractures.* When the casualty being transported has a fracture of the leg, or if for any reason it is considered desirable to carry the casualty upstairs feet first or downstairs head first, the bearers are reversed, in the former case No. 2 man becoming the front bearer and in the latter, No. 3.

### **63. Negotiating a Staircase Having Small Landings**

*a. Upstairs Carry.* When carrying a loaded litter up a flight of stairs where there is not sufficient room on the landings to wheel the litter around, the squad proceeds up to the first landing with men Nos. 1 and 3 supporting the head of the litter and men Nos. 2 and 4 the foot (fig. 99). Upon arrival at the first landing No. 3 man turns, facing the head of the litter and supporting it, while No. 1 man proceeds several steps up the next flight of stairs (fig. 100). Men Nos. 2 and 4 raise the foot of the litter until No. 1 man can grasp the litter



*Figure 99. Carrying litter up first flight of stairs.*



*Figure 100. No. 3 man supports head of litter; No. 1 man proceeds up second flight of stairs.*

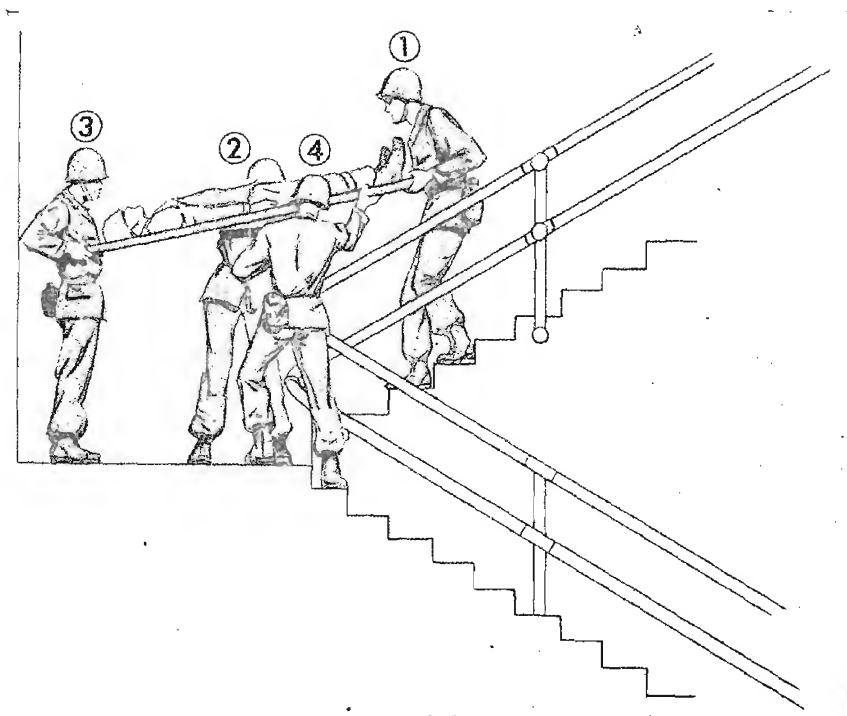
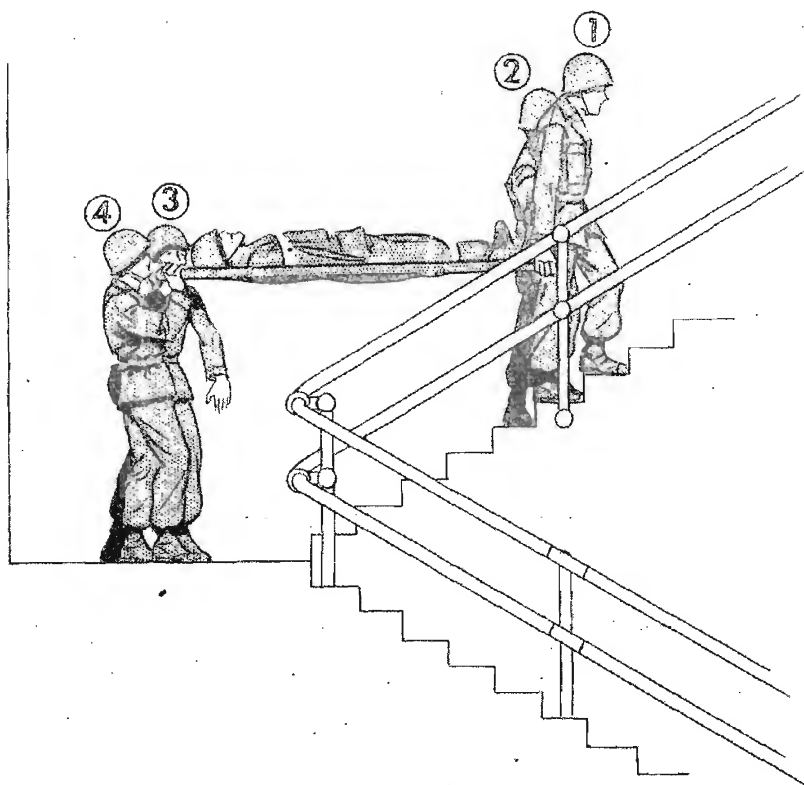


Figure 101. *Lifting litter over bannister to second flight of stairs.*

handles. Men Nos. 1 and 3, with Nos. 2 and 4 assisting, then lift the litter over the bannister to the second flight of stairs (fig. 101). No. 4 man assists No. 3 man to carry the head of the litter up the second flight, while No. 2 man advances and assists No. 1 man in carrying the foot of the litter (fig. 102). This method should never be used without first securing the casualty to the litter.

*b. Downstairs Carry.* When carrying a loaded litter down a flight of stairs where there is not sufficient room on the landings to wheel the litter about, the litter squad proceeds down the steps to the first landing with men Nos. 1 and 3 supporting the head of the litter and men Nos. 2 and 4 supporting the foot (fig. 103). Upon arrival at the first landing, No. 4 man turns and faces the litter and supports the foot of it while No. 3 man supports the head (fig. 104). Men Nos. 1 and 2 descend a few steps of the second flight of stairs and receive the head of the litter which is handed over the bannister to them by No. 3 man (fig. 105). No. 3 man then assists No. 4 man to support the foot of the litter while the squad moves down to the next landing. The casualty must always be secured to the litter.



*Figure 102. Proceeding up second flight of stairs.*

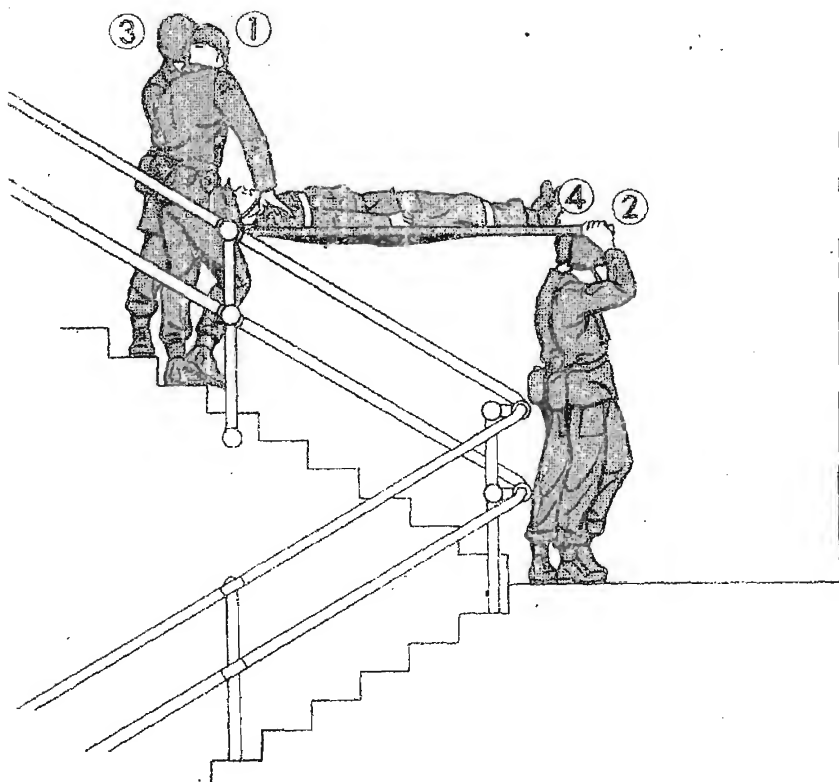
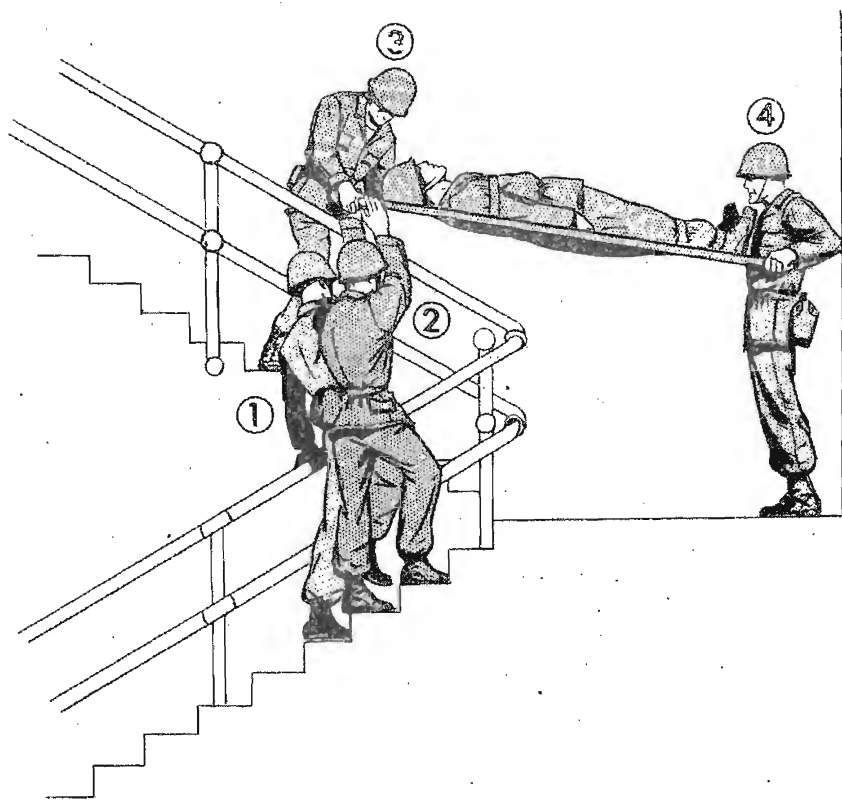


Figure 103. Going down first flight of stairs.



*Figure 104. Passing litter over bannister.*

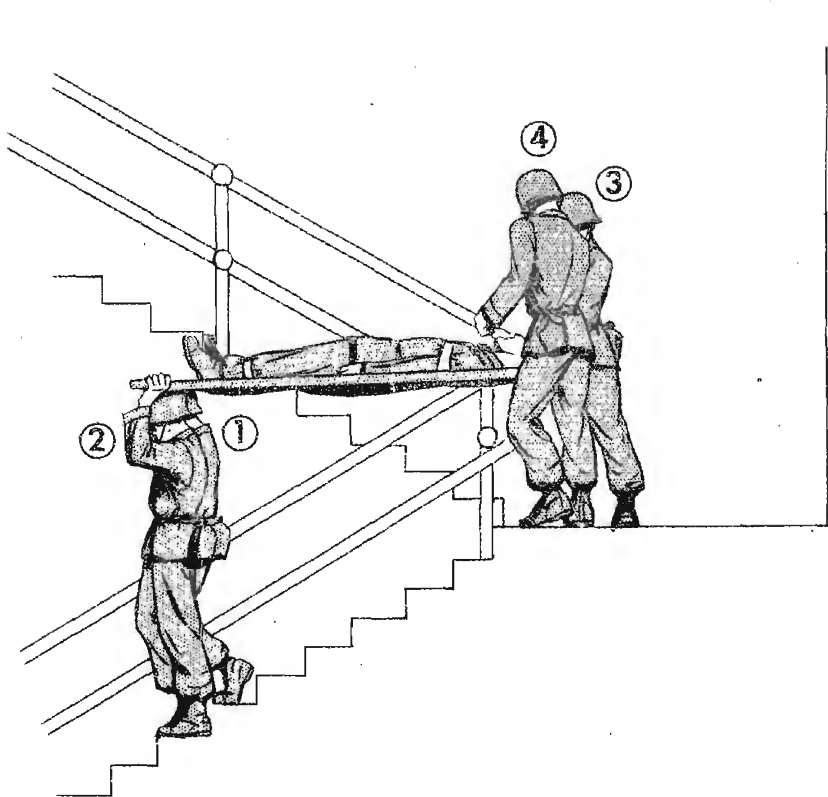


Figure 105. Proceeding down second flight.

#### 64. Trenches, Dugouts, and Other Excavations

To negotiate narrow trenches, dugouts, and the like, men Nos. 2 and 3 maintain their positions at the handles and assisted by men Nos. 1 and 4, lift the litter over their heads and above the narrow trench. Men Nos. 1 and 4 then step beneath the litter, grasp the litter poles, and assist in supporting the litter as all advance.

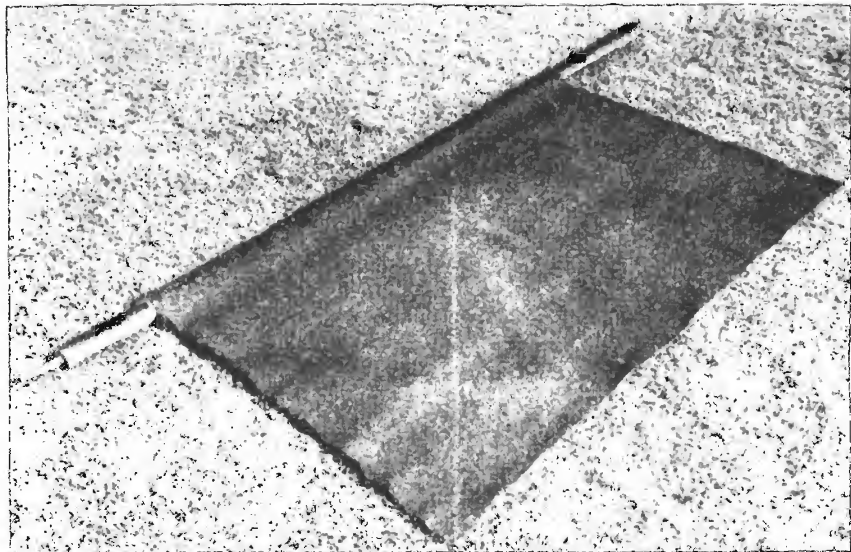
#### 65. Culverts, Tunnels, and Large Pipes

To negotiate culverts, tunnels, large pipes, and similar obstacles, No. 2 man faces the litter and backs through the obstacle, No. 3 man maintaining hold of the rear handles. No. 1 man precedes and No. 4 man follows the litter.

#### 66. Narrow Bridges, Gangplanks, Catwalks, Narrow Paths, Etc.

In carrying the litter across any obstacle too narrow to permit bearers to advance in normal positions, No. 1 man precedes and No. 4 man follows the litter as men Nos. 2 and 3 maintain their usual positions of carry.





*Figure 106. Improvising litter with poles and blankets; position of first pole.*

## **Section VIII. IMPROVISED LITTERS**

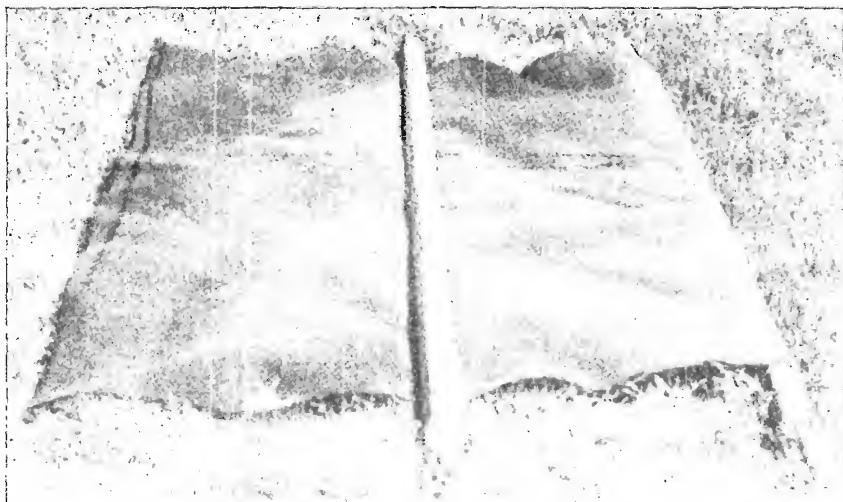
### **67. General**

At times a casualty may have to be moved when a litter is not available. Short distances may be covered by means of manual carries described in chapter 2, if the casualty's injury will not be aggravated by such a procedure. Where the distance is long, or the casualty has an injury such as a fractured leg, back, or neck, a litter should be improvised from materials at hand. Several types of improvised litters are described in paragraphs 68 through 72.

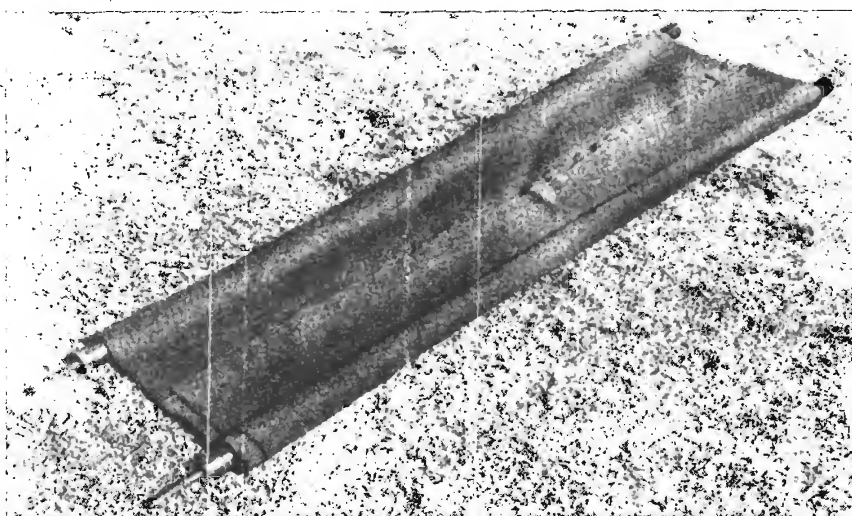
### **68. Pole and Blanket Litter**

A blanket, shelter half, tarpaulin, or similar material may be used for the litter bed. The poles may be improvised from branches, boards, tent poles, skis, lengths of pipe, rifles, or any appropriate objects at hand.

- a.* The blanket is spread open on the ground.
- b.* One pole is laid lengthwise across the center, and the blanket folded over (fig. 106).
- c.* The second pole is placed across the center of the new fold (fig. 107).
- d.* Free edges of the blanket are folded over the second pole (fig. 108).



*Figure 107. Improvising litter with poles and blankets; position of second pole.*



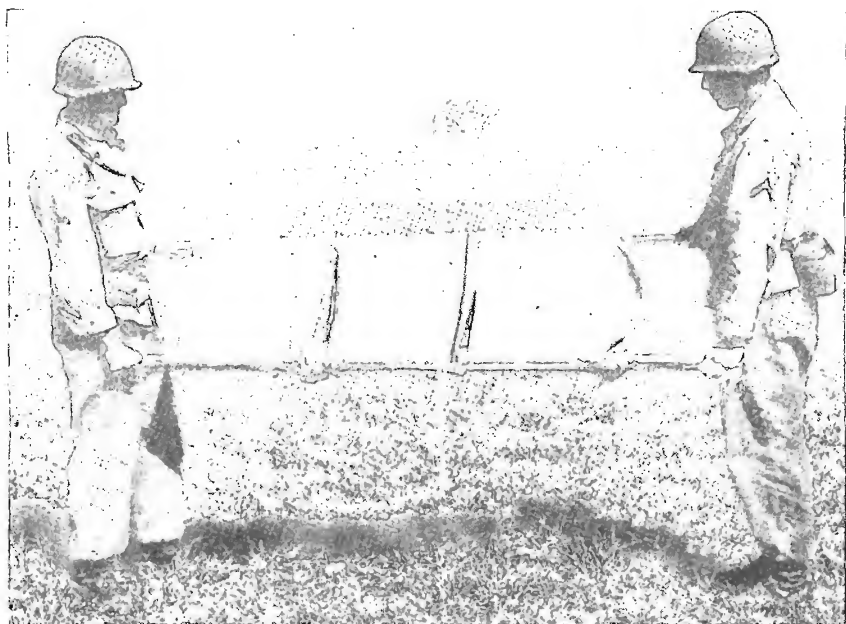
*Figure 108. Improvising litter with poles and blanket; litter completed.*

#### **69. Pole and Jacket Litter**

A litter can be made by folding two or three blouses, shirts, or jackets, buttoning them up, and turning them inside out so that the sleeves are on the inside, and passing a pole through each sleeve (fig. 109).

#### **70. Door or Board Litter**

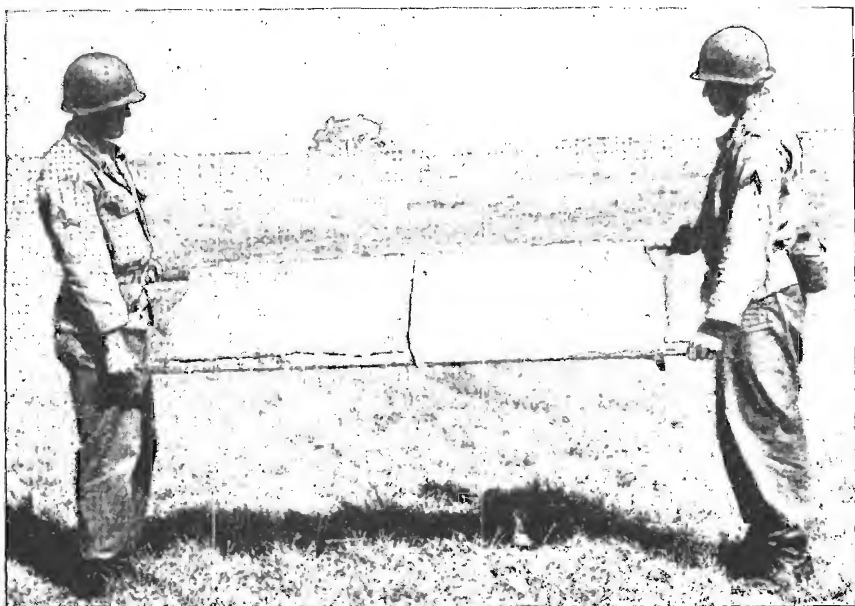
Any plane-surfaced objects may be used if of suitable size, such as cots, window shutters, doors, benches, ladders, boards, or poles tied together. The litter should be padded if possible (fig. 110).



*Figure 109. Litter improvised from poles and jackets.*



*Figure 110. Door used as a litter.*



*Figure 111. Litter improvised from poles and sacks.*

#### **71. Pole and Sack Litter**

The bottoms are ripped open, or the corners of sacks, bags, bedticks, or mattress covers may be cut and two poles are passed through them (fig. 111).



*Figure 112. Rolled blanket used as a litter.*

## **72. Blanket Litter**

If no poles can be obtained, a blanket, shelter half, tarpaulin, or similar object can be rolled from both sides toward the center (fig. 112). The rolls are used as grips when carrying a casualty.

## CHAPTER 4

### AIDS IN LITTER TRANSPORTATION

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#### Section I. LITTER AIDS

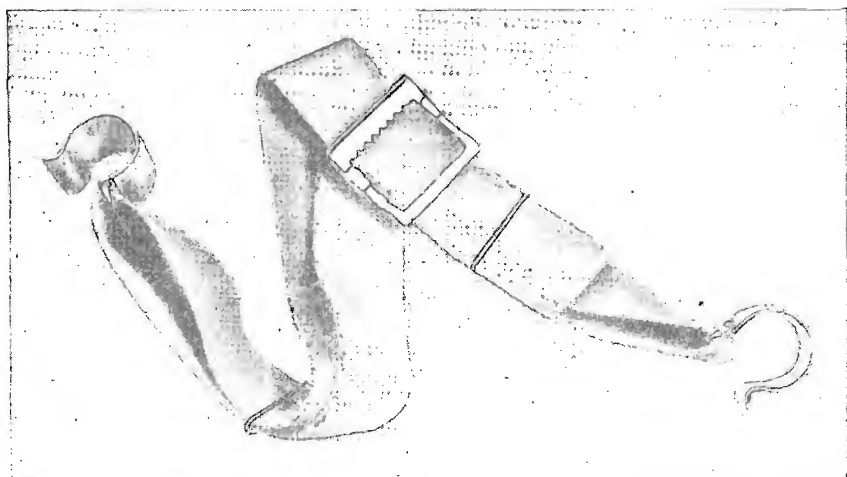
##### **73. General**

The manual carrying of a loaded litter is one of the most tiring tasks performed by the personnel of the Medical Service. Since the critical point in the chain of evacuation within any area lies between the casualty on the field and the most forward ambulance, every effort is made to minimize the task of litter bearers. Front line medical installations, including advanced ambulance loading posts, are placed as far forward as the tactical situation and terrain will permit. Any mechanical device issued or improvised that will speed evacuation is used.

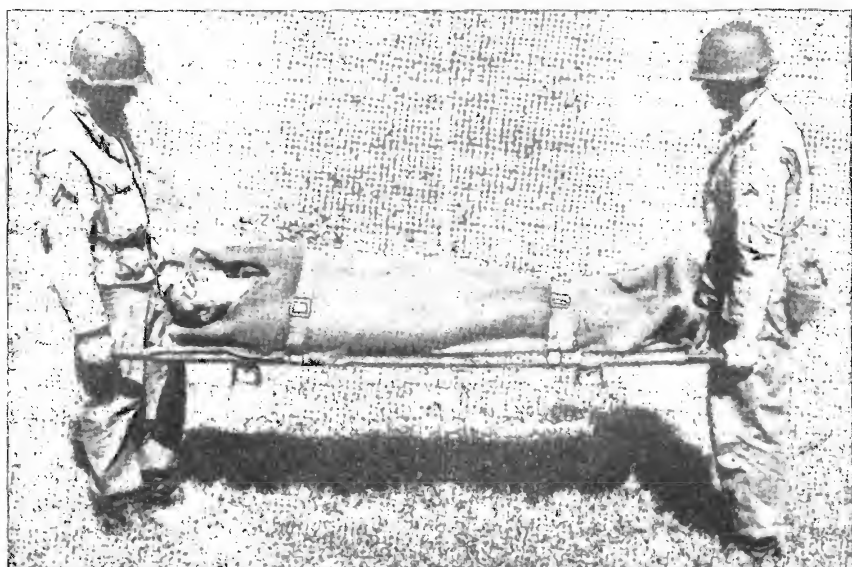
##### **74. Litter Securing Strap**

*a.* Litter securing straps are available in the ratio of four per litter. The strap consists of a length of 2-inch webbing with buckle and two metal hooks, one at each end (fig. 113). The purpose of the securing strap is to hold the litter casualties in position on the litter. The litter securing strap is designed to fit the straight aluminum litter (fig. 37) and the folding aluminum litter (fig. 38). When movement is over relatively level areas, two securing straps will normally be sufficient. One strap is placed across the casualty's chest and another across his legs below the knees (fig. 114). In securing the straps, one end is fastened by the metal hook to the litter pole; the strap is then carried across the casualty's body and fixed to the far litter pole by the hook on the other end of the strap (fig. 115). When the litter is to be moved over rough terrain, or the movement is of such nature that there is danger of the casualty falling from the litter, four securing straps are used. The four straps may be placed one across the chest, one across the waist, one across the thighs, and one across the legs below the knees (fig. 116).

*b.* If moving up and down steep slopes, the following method may be employed: Two straps are applied across the chest and legs, as described in *a* above; the other two straps are applied as follows: one is clasped to the litter pole, carried over the thigh of one leg, and passed between the legs and under the other leg to the far pole.



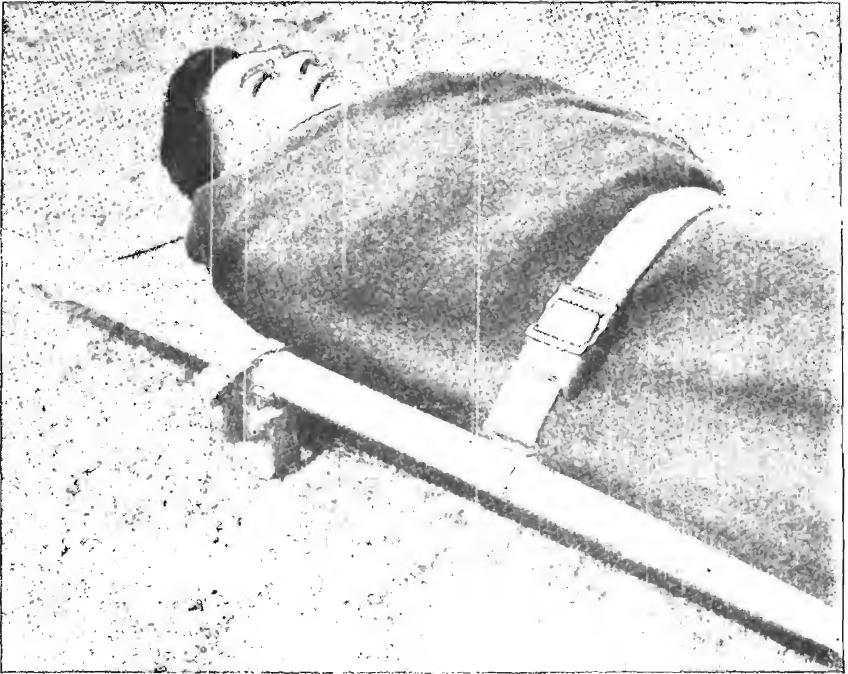
*Figure 113. Litter securing strap.*



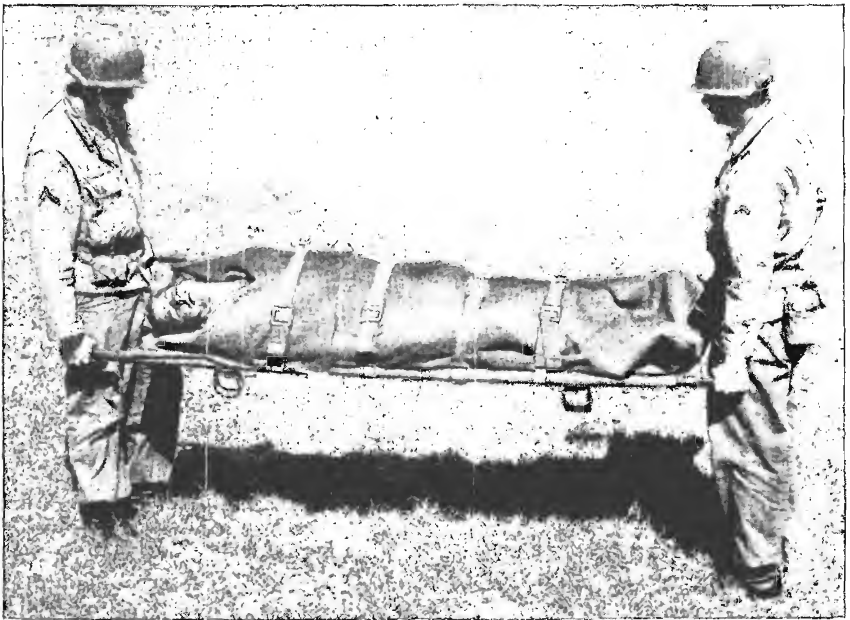
*Figure 114. Two securing straps (for normal terrain).*

The other strap is applied in the reverse manner; that is, clasped to the far pole, carried over the thigh of the far leg, under the near leg, and finally attached to the near pole (fig. 117).

c. Litter securing straps are never placed where they will interfere with wounds or splints. If the casualty has a fractured leg which has been splinted, straps are passed over the uninjured leg only, since the litter bar will serve to hold the splinted leg in position.



*Figure 115. Method of fixing strap in place.*



*Figure 116. Four securing straps (for rough terrain).*



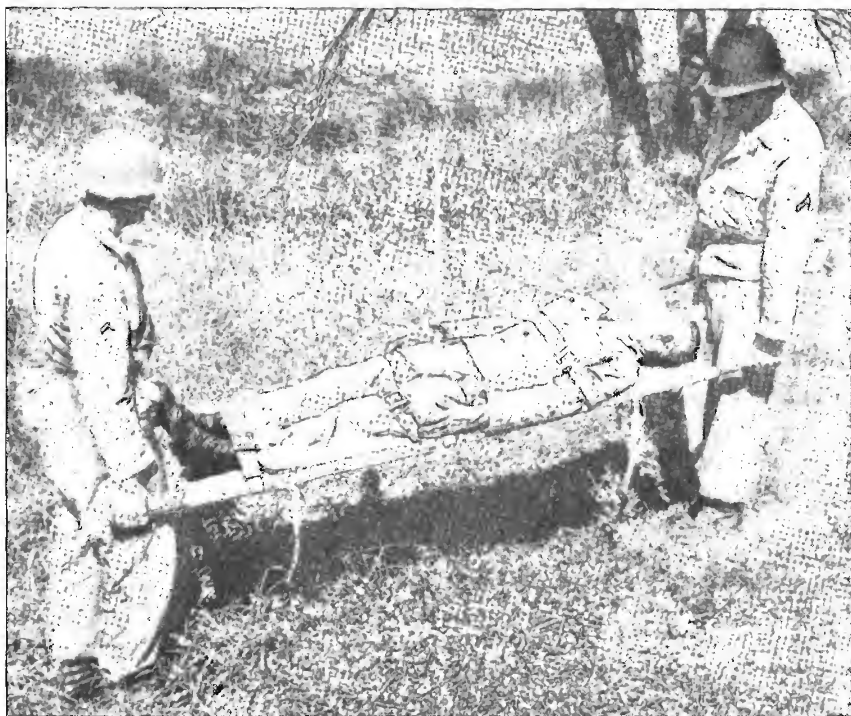


Figure 117. Four securing straps fixed for vertical movement.

## 75. Uses of the Cacolet and Travois

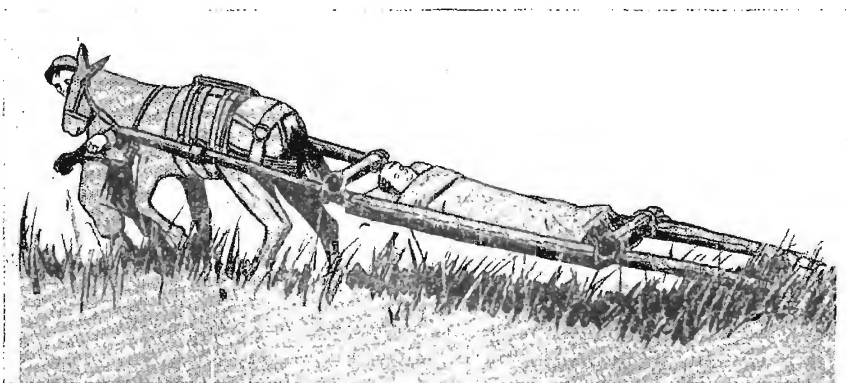
*a. Cacolet.* A cacolet is a packsaddle fitted with a litter. Many types have been used. A cacolet can be improvised using standard Army packsaddles and litters. It is useful in mountain or jungle country where long, manual litter carries might otherwise be necessary (fig. 118).

*b. Travois.* The travois is a contrivance for the transportation of sick and wounded, consisting of two long poles lashed at one end to each side of a horse or similar animal, the other ends trailing the ground (1, fig. 119). Crossbars are lashed across these poles to receive the load. A travois may be constructed by cutting poles about 16 feet long and 2 inches in diameter at the small end. These poles are laid parallel to each other, large ends to the front and  $2\frac{1}{2}$  feet apart, the small ends 3 feet apart with one of the latter projecting some 8 or 10 inches beyond the other to impart a rocking rather than a jolting motion to the load. The poles are connected by a crossbar about 6 feet from the front ends and another about 6 feet back of the first, each notched at the ends and securely lashed to corresponding notches in the long poles. Between the crosspieces the litter bed,



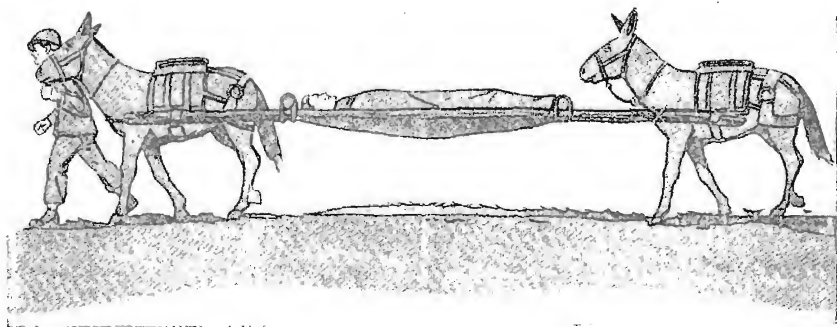
*Figure 118. Cacolet.*

6 feet long, is filled in with a blanket, canvas, or similar material, securely fastened to the poles and crossbars. In lieu of canvas or a blanket, a rope or straps may be stretched obliquely from pole to pole, in many turns, crossing each other to form the basis for a light mattress or improvised bed. A litter or cot may be fastened between the poles for the same purpose. The front ends of the poles are securely fastened to the saddle of the animal. On the march, bearers should be ready to lift the rear end of the travois when passing obstacles, fording streams, or going uphill. If desired, the rear ends of the poles, instead of being allowed to drag, may be lashed to the saddle of a second horse which follows the first in tandem (2, fig. 119).



① One-horse.

*Figure 119. Travois.*



© Two-horse.

Figure 119—Continued.

## Section II. LITTER EVACUATION IN SNOW AND EXTREME COLD

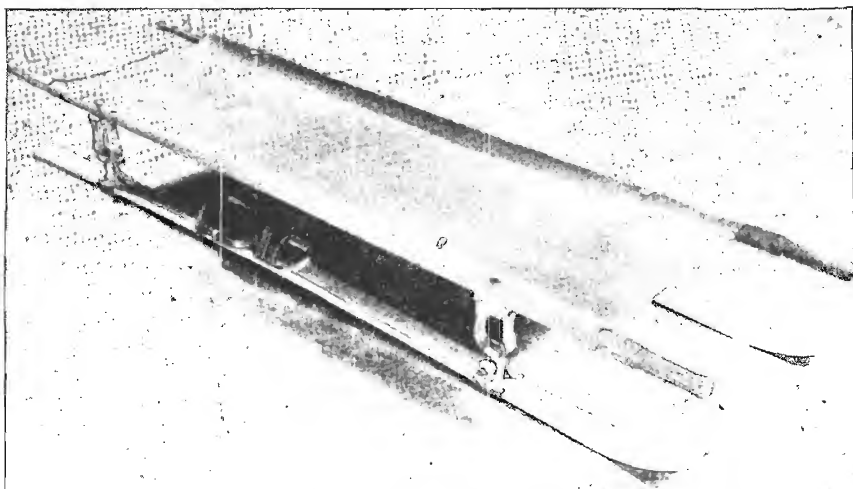
### 76. General

Cold hastens the progress of shock and lessens the chances of recovery if a casualty is exposed for any extended length of time. Prompt collection of casualties and their rapid evacuation to locations where they can be kept warm is mandatory. The first aid treatment given is modified according to the weather, the type of clothing worn by the casualty, and the discretion of the person giving treatment. It is particularly important to guard against shock by conserving body heat. Casualties are, therefore, placed in specially constructed casualty evacuation bags at the earliest possible moment. When casualty bags are not available, Arctic sleeping bags or other articles are used for cover. Treatment is limited to the control of hemorrhage, the prevention or treatment of shock, the prevention of infection, and the splinting of fractures (FM 31-70).

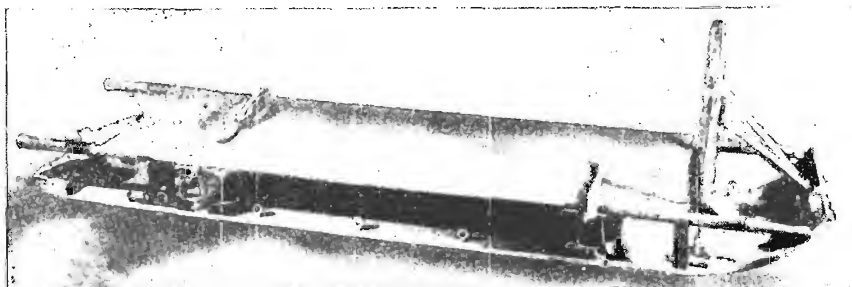
### 77. Aids to Litter Evacuation in Snow and Extreme Cold

Since manual evacuation by litter is markedly hindered under conditions of extreme cold and deep snow, and, as a result, litter bearers are subject to excessive fatigue, some of the following aids in litter evacuation should be employed whenever feasible. These are either hand-drawn by litter bearers or, if the tactical situation permits, animal-drawn, or towed by vehicles.

*a. Litter Ski Adapter* (1, fig. 120). Four adapters hold a standard litter on two skis. The adapters clamp on the litter stirrups and keep the litter above the surface of the snow. The casualties can easily be pulled by attaching ropes to the converted litter.



① A standard litter attached to skis by litter ski adapters.



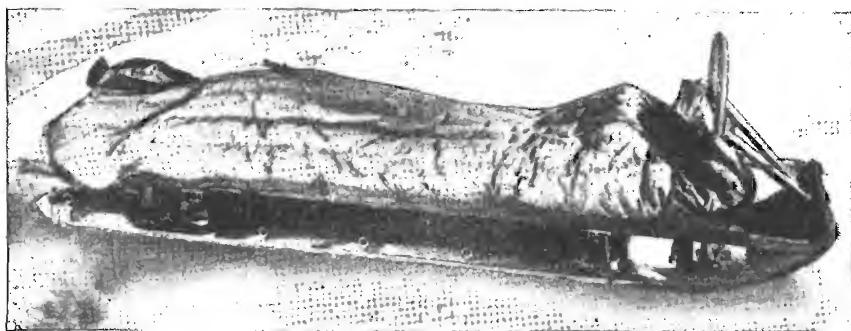
② Litter mounted on a military toboggan by means of toboggan litter adapters.

*Figure 120. Ski or toboggan.*

*b. Toboggan-Litter Adapter* (2, fig. 120). A litter may be carried on the regular military toboggan by using adapters. Any of the various type sled-toboggans or sleds can be used for transporting sick and injured. Several casualties can be moved on the 1-ton cargo sled when some form of tracked vehicle is used for pulling the sled.

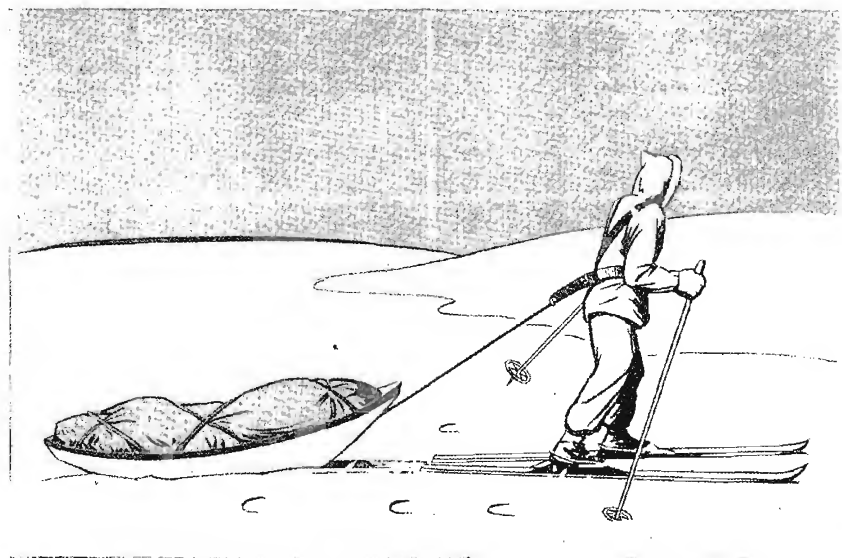
*c. Casualty Evacuation Sleeping Bag* (3, fig. 120). In order to keep a casualty warm in cold climates an adaptation of the sleeping bag is issued for use with standard litters, toboggans, etc. It is called the casualty evacuation sleeping bag. It zips up to protect all parts of the patient and is used instead of blankets.

*d. Snow Boats or Ahkio.* The ahkio is useful for certain types of evacuation, especially where movement is through deep snow. One casualty can be moved in this carrier. The boatlike shape of the ahkio plows through snow, and the high sides afford considerable protection for the casualty (fig. 121).



⑤ A casualty evacuation sleeping bag used with a toboggan.

*Figure 120—Continued.*



*Figure 121. Snow boat or ahkio.*

### **Section III. LITTER EVACUATION IN MOUNTAIN OPERATIONS**

#### **78. General**

*a.* Transportation of the sick and wounded in mountain regions is hampered by the terrain and climatic conditions prevailing in such localities. There are great changes in elevation, extreme compartmentation, and poor roads; temperatures are low, snow and ice cover the ground the year around in certain regions, and there are abrupt local weather disturbances.

*b.* These conditions have a marked influence on litter evacuation and require modifications in normal litter handling. On level terrain a four-man litter squad can move a casualty 1,000 yards and return in

an hour. In mountainous country, a six-man squad can cover 400 yards and return in the same time. When operating in mountainous country it is customary for litter squads to be increased to six men.

c. Whenever possible, litter relays should be employed when transporting sick and wounded in mountain warfare. A long litter haul is tiring and slow. Using short litter hauls and frequent relays enables bearers to operate at maximum efficiency. It also enables them to learn the trail thoroughly and thus to move casualties more safely during periods of poor visibility.

d. Men assigned to litter squads for mountain service must be trained in rock climbing, in the use of ropes, and in individual and unit movements at high altitudes. For additional information on mountain movement and warfare see FM 70-10.

### **79. Lashing Litters**

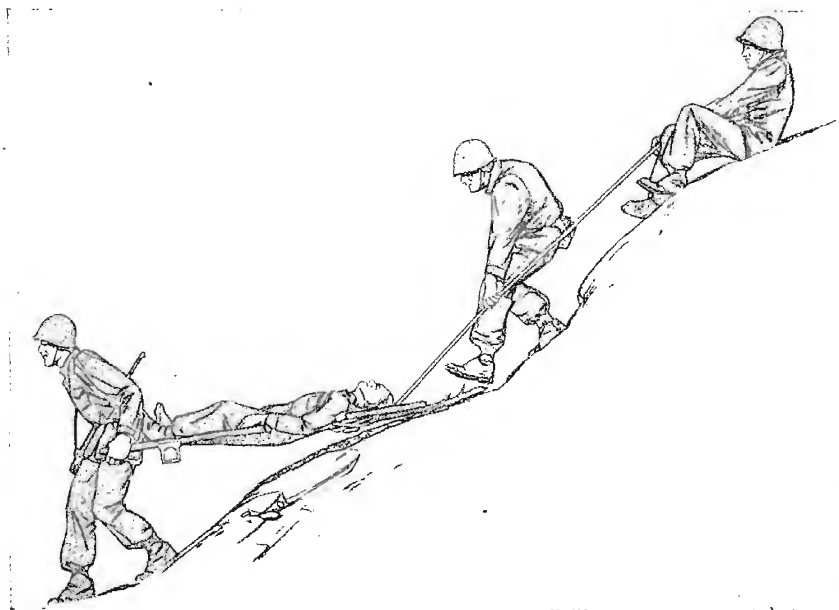
The mountain basket litters or the semirigid canvas litters are preferred for mountain evacuation. Any standard litter, however, may be used. Since movement will usually be up or down slopes or along the side of a mountain, the casualty must be securely lashed to the litter. Litter securing straps are used if available, though rope can be used. A rope is passed through the head stirrups, lashed in place, and used as a support when ascending and descending slopes.

### **80. Modified Travois**

A modified travois can be used when descending a relatively smooth slope. Cut two poles about 18 feet long; the large end of the poles should be about 3 inches in diameter. These poles are fastened to the litter stirrups so that a length of from 5 to 10 feet of the poles extends beyond the litter. This length of pole acts as a runner. One bearer supports the foot of the litter by a rope sling and guides the litter downhill. Another bearer uses a rope to lower the casualty and litter. A third bearer assists the rope man and relieves him at frequent intervals (fig. 122). By this method considerable speed can be made on slopes, and cliff faces 4 to 6 feet high can be passed without difficulty.

### **81. Ascending Slopes**

In ascending a steep slope, the litter is prepared and the casualty is immobilized as described in paragraph 79. Two litter bearers take their places at the head of the litter, and a third, using an improvised rope sling, takes his place at the foot. A thin sapling passed through the stirrups and extending 18 inches on either side of the lines affords a more secure grip for the two litter bearers at the head of the litter. The fourth and fifth men take their positions along the extended rope which is in the hands of the sixth. At the signal UP ROPE, the fourth, fifth, and sixth men pull, while the first, second, and third



*Figure 122. The litter travois.*

men lift the litter and slowly climb uphill. The men carrying the litter should not try to do all the work but should allow themselves to be pulled up the slope while they hold the litter off the ground. The positions of the men should be rotated at each halt so that the work will be distributed equally.

## **82. Descending Slopes**

In making the descent, the litter is prepared as described in paragraph 79 and the casualty is immobilized on the litter. Two men hold the rope to assist in lowering the litter. The three litter bearers take their positions as for the ascent. The sixth man may assist with the litter or precede the team, picking a trail, making the passage more negotiable by clearing away shrubs and vines, and making a reconnaissance so that the team need not retrace its steps if a cliff should be encountered (fig. 123). In making the descent, the most direct, practicable passage should be taken.

## **83. Cliffs**

a. If a cliff is too extensive to bypass, the smoothest face for the descent is selected. The casualty is secured as before. Two large poles, the length of the litter or longer, are attached to the stirrups and act as runners. The lashing ropes on the poles should be tied in notches cut in the poles; otherwise their rubbing against the stone cliff may cause them to fray.



*Figure 123. Method of lowering casualties down steep descending slopes.*

*b.* Ropes are attached to the stirrups at the foot of the litter and used as guy ropes to keep the litter from revolving. Two men lower the litter over the cliff edge, while a third secures the rope around a tree, or large boulder. One man descends the cliff face on a rope, moving parallel to the litter, and assists the litter over any projections. The remaining bearers guide the litter from the foot of the cliff by holding the guy ropes. When the litter has almost reached the base of the cliff they ease it to the ground (fig. 124).

#### **84. Monocable Casualty Evacuation**

In addition to the methods of transporting casualties down descending slopes (par. 82) and cliffs (par. 83), casualties may be transported over obstacles by using the monocable casualty evacuation apparatus (fig. 125). This apparatus consists of a continuous wire rope cableway, secured by a system of snatch-blocks, and spanning a maximum of 1,000 feet between terminals. A slope of at least 10° is required for proper operation. A Stokes litter is suspended from the top cable at the upper terminal, and a second litter is suspended from the bottom cable at the lower terminal. A casualty placed in the litter at the upper terminal will be lowered by gravity to the lower terminal, at the same time the empty litter at the lower terminal will be raised to the upper terminal ready to receive another casualty.





Figure 124. Lowering casualty down cliff.

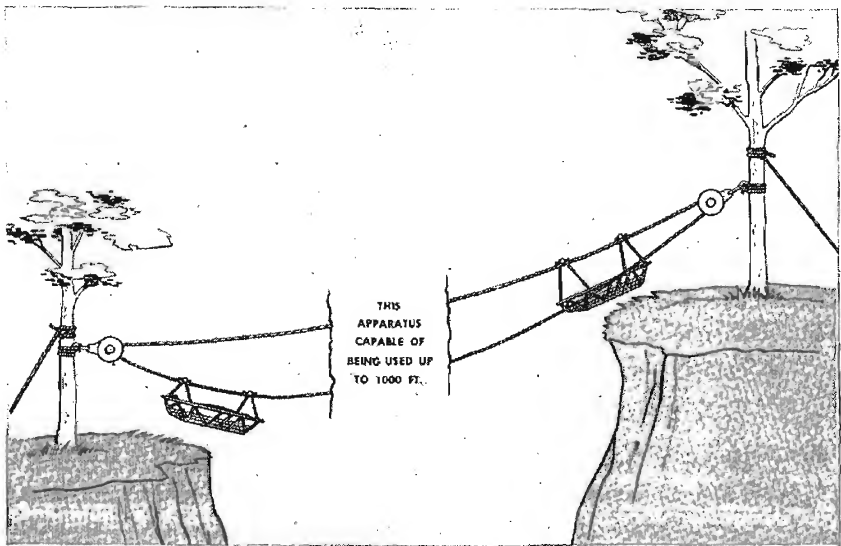


Figure 125. Monocable casualty evacuation apparatus.

## CHAPTER 5

### MOTOR AMBULANCE TRANSPORTATION

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#### Section I. GENERAL

##### 85. Definition

A motor ambulance is a vehicle primarily designed to transport the sick and wounded.

##### 86. Ambulance Personnel and Equipment

The ambulance crew consists of two men: one is the driver and the other is the ambulance orderly. The driver is responsible for the vehicle at all times. He performs driver maintenance and is responsible for reporting major defects to his section leader or, if the latter is not available, to the unit transportation sergeant. The ambulance orderly acts as assistant driver; he prepares the ambulance for loading and unloading and thereafter for departure; and he renders necessary emergency treatment to patients being transported. All ambulances normally carry litters and a supply of blankets and splints.

##### 87. Types of Ambulances

Motor ambulances in use by the medical service are classified as field ambulances, bus ambulances, and metropolitan ambulances.

*a. Field Ambulances.* These ambulances are designed for use with field units. They have the ability to cross rough ground, climb steep grades, and operate cross-country if required to do so.

- (1) *Truck, ambulance, 3/4-ton, 4 x 4, M 43* (fig. 126). This is the standard field ambulance of the medical service of divisions and higher units. It is capable of fording bodies of water up to 42 inches in depth, and can be operated while completely submerged if equipped with a deep water kit. For operation in extremely low temperatures, the vehicle may be equipped with an arctic winterization kit which permits operating the vehicle in temperatures as low as  $-65^{\circ}$  F. It has berths for four litter cases and is equipped with blackout curtains, and an operating lamp. In an emergency, one additional litter may be carried on the floor. However, this ambulance is primarily designed to be used for four litters only, in order to leave sufficient space for the attendant to care for casualties. It is capable of carrying eight sitting cases. The body of the ambulance is separated from the driver's seat by a par-

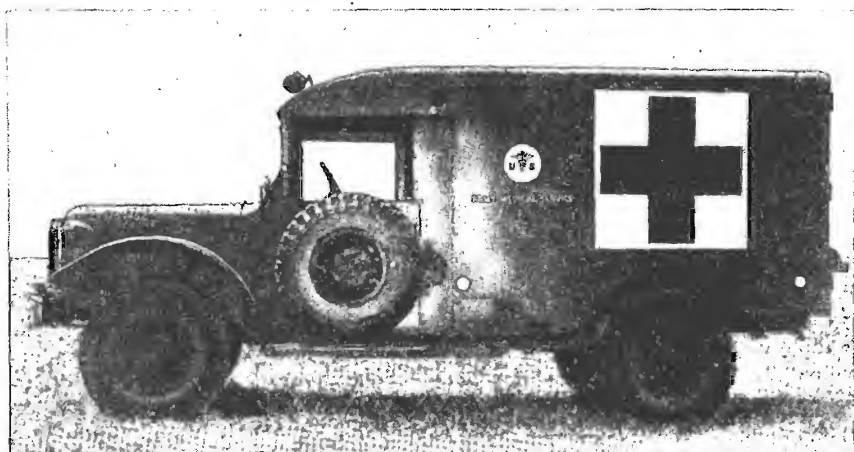


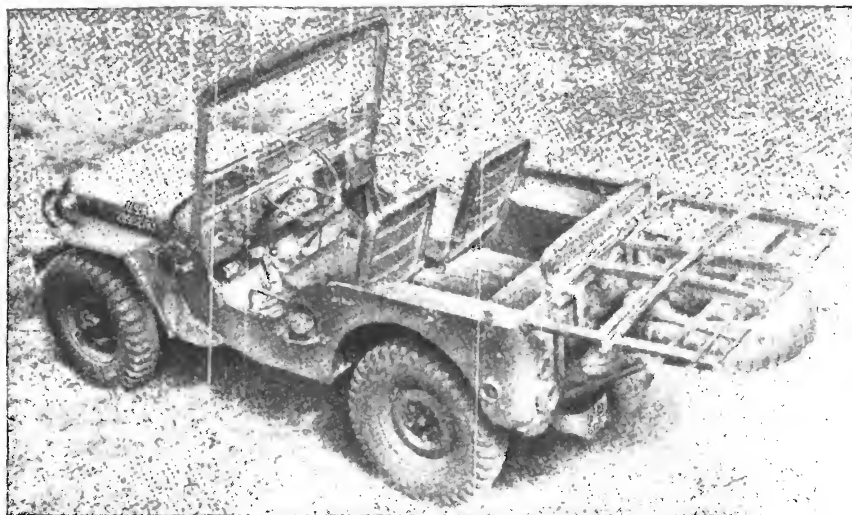
Figure 126. Truck, ambulance;  $\frac{1}{4}$  ton, M43.

tition and by a small door. The body is gas-proof, and is ventilated, lighted, and heated. Casualties may be given attention from the aisle between the berths.

(2) *Truck,  $\frac{1}{4}$ -ton, 4 x 4.*

(a) *Truck, ambulance, front-line.* The forward area ambulance is specifically designed to combine the maneuverability of the ordinary  $\frac{1}{4}$ -ton truck with the advantages of a closed ambulance in which patients are out of the weather and can be kept warm by a heater. This long-wheelbase  $\frac{1}{4}$ -ton truck has space for two litter patients and two ambulatory patients, or three litter patients.

(b) *Converted  $\frac{1}{4}$ -ton truck.* When modified by the addition of a litter-securing bracket, an ordinary jeep may be used as an ambulance. The addition of this litter securing bracket does not affect the primary use of this vehicle as a personnel and supply carrier (1, fig. 127). The small size and cross-country mobility of this vehicle make it a satisfactory casualty carrier for forward units. The addition of a litter securing bracket enables the truck to carry two litters (2, fig. 127). A special top protects the casualties during inclement weather (3, fig. 127). To mount the bracket on the truck, the spare tire and gasoline can, together with their racks, must be removed. The back of the rear seat must be folded down over the seat. The outside pair of bolts on the two rear bumpers are loosened and the lifting hooks attached to the inside bolts of the bumpers are removed. One of the small fittings (3, fig. 128) is then bolted to each of the outside bumper securing bolts to support the frame braces (3, fig. 128). The litter



① Securing bracket folded.



② Securing bracket and two litters.

*Figure 127. Truck, 1/4-ton, 4 x 4, with litter.*

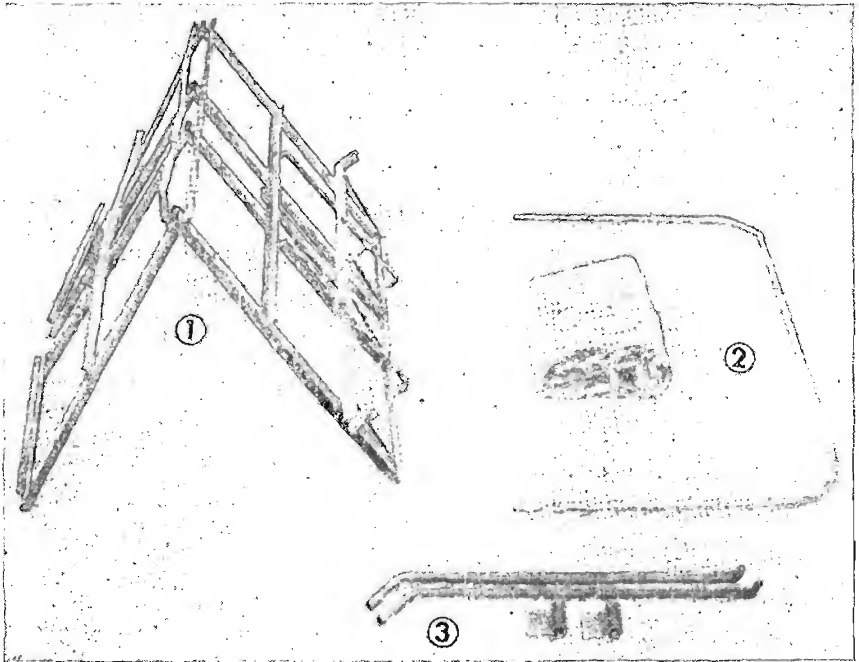


③ Securing bracket and top.

*Figure 127—Continued.*

securing bracket which folds in the middle (1, fig. 128), can then be mounted or removed in a short time. It is fitted over the back of the truck, the joint of the bracket fitting over the tail gate and rear plate of the truck (1, fig. 127). Braces (3, fig. 128) support the back end of the bracket. A bow (2, fig. 128) fits into the bracket to support the canvas top. Litters may then slide into the tracks on the bracket. They should be bound to the bracket and the casualties secured to the litters with litter securing straps.

*b. Bus, 36 Passenger, 4 x 2, Integral Type (Bus Ambulance) (fig. 129).* This vehicle was designed for rapid conversion into a bus ambulance. It is available to overseas general hospitals and other army units. It can be used in support of the army in the field as far forward as the road network and tactical situation will permit. However, it is most useful in situations where a large number of casualties are to be transported for relatively short distances over improved roads such as in transferring casualties from holding companies and hospitals to airheads, railheads, and ports of embarkation. Without any modification this bus has a capacity of 36 ambulatory casualties. By the addition of one tier of litters above the seats, six litter casualties may be transported in addition to, and without interfering with, the 36 ambulatory casualties (fig. 130). The backs of the seats may be folded forward to accommodate a total of 12 litter casualties in 2 tiers of six litters (fig. 131). When large numbers of litter casualties are to be transported, the bus can be readily converted by the removal of the seats to accommodate 18 litter casualties and 2 attendants (fig. 132).



① Litter bracket.

② Top bow and canvas top.

③ Frame braces and fittings.

Figure 128. Parts of litter securing bracket for  $\frac{1}{4}$ -ton truck.

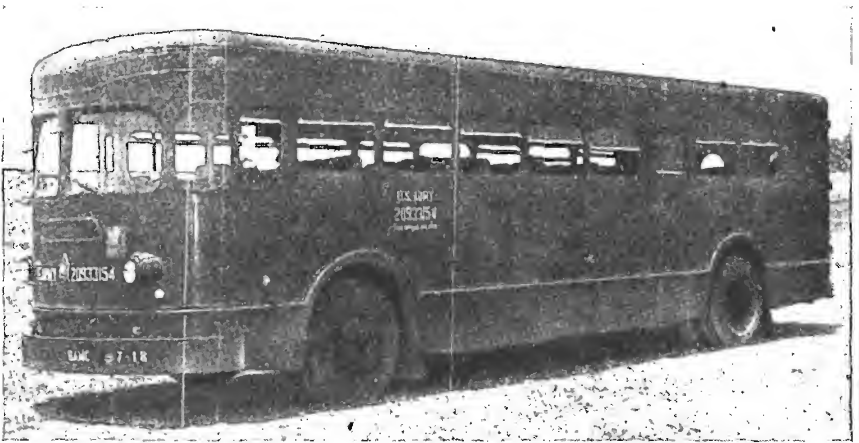
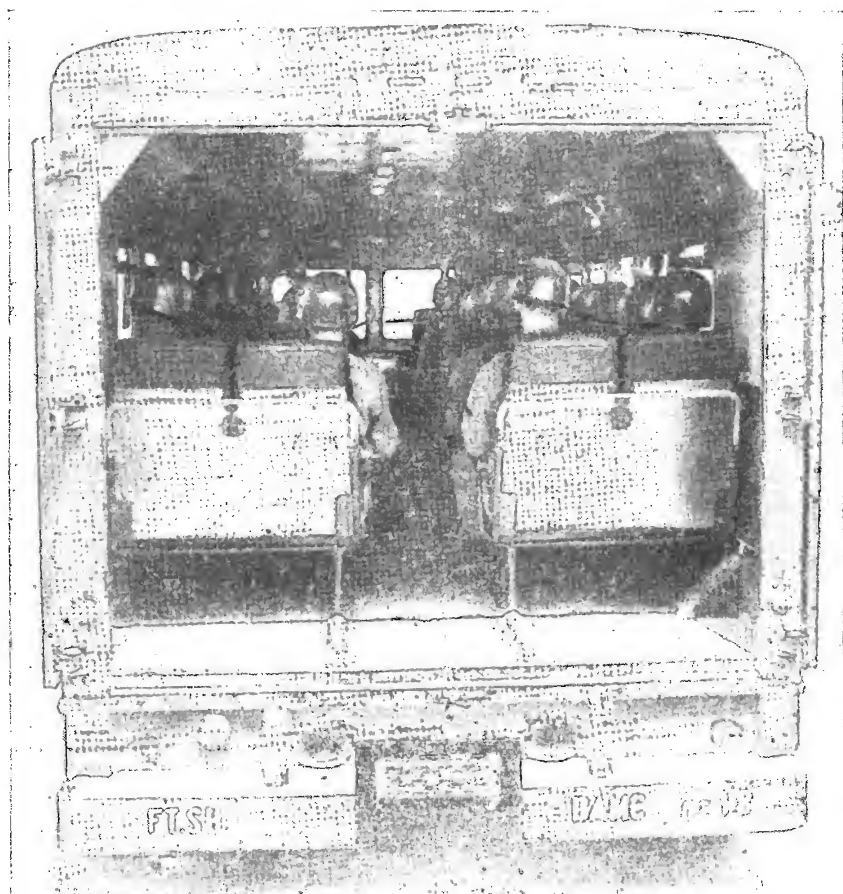
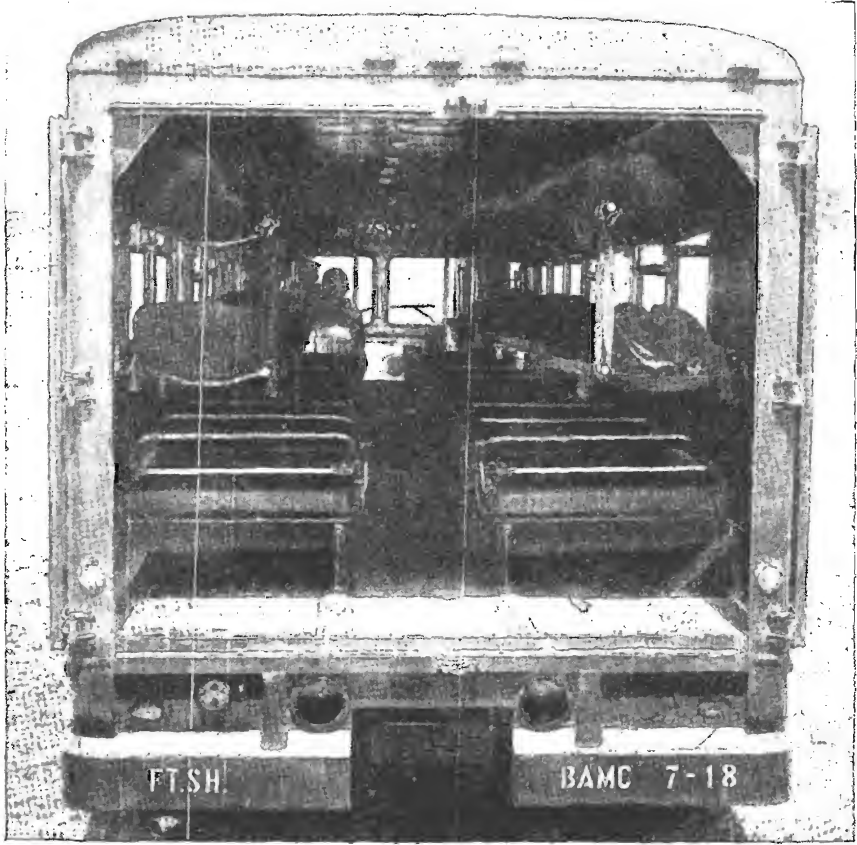


Figure 129. Bus, 36 passenger, 4 x 2, integral type (bus ambulance).

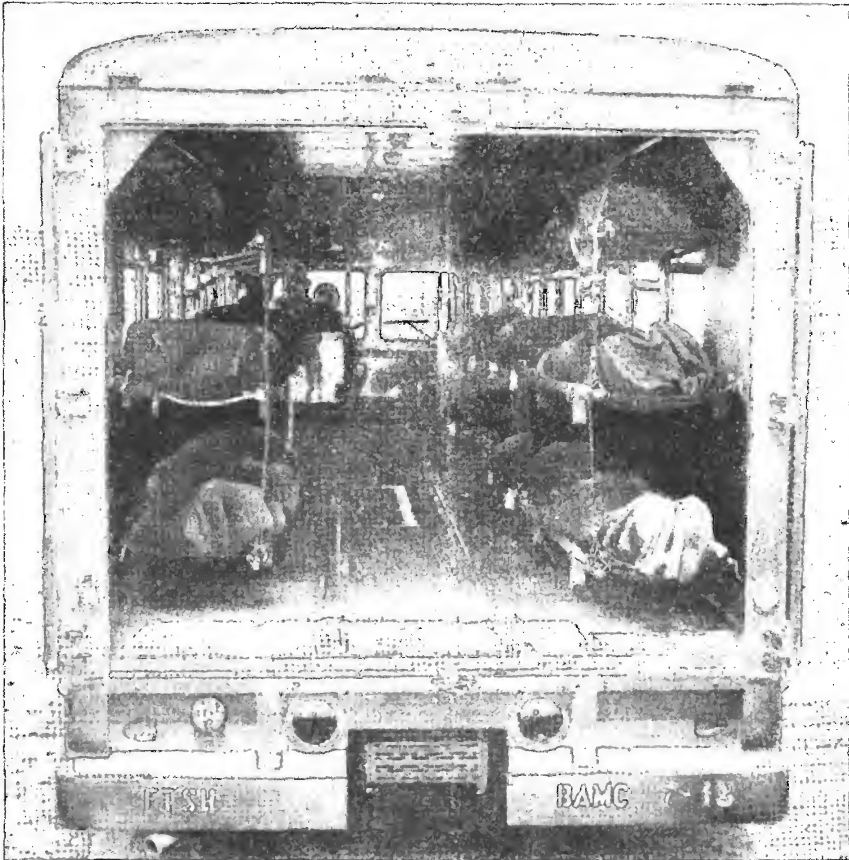


*Figure 130. Bus ambulance loaded with 36 ambulatory and 6 litter casualties.*



*Figure 131. Bus ambulance loaded with 12 litter casualties.*





*Figure 132. Bus ambulance loaded with 18 litter casualties and two attendants.*

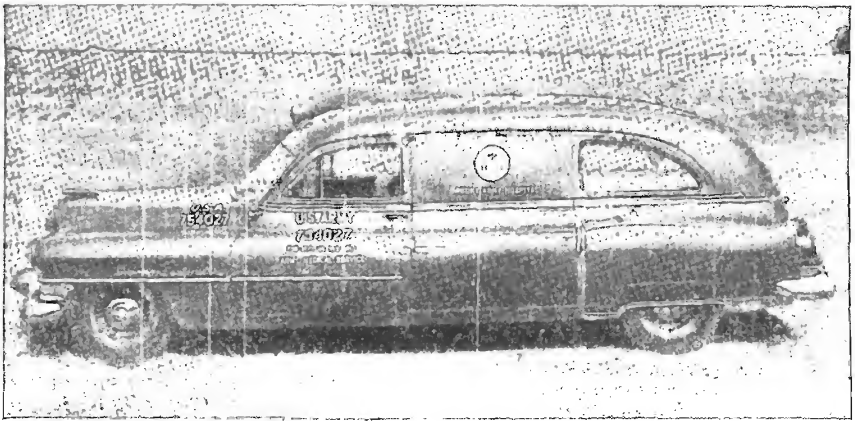


Figure 133. Metropolitan ambulance.

*c. Metropolitan Ambulance.* The large metropolitan ambulance is supplied to named Army hospitals and to certain other large hospitals. It is designed for use on good roads only (fig. 133). The ambulance cot litter, Bomgardner type, is ordinarily used with this ambulance. The capacity of this ambulance is one Bomgardner litter and three field litters; or four field litters; or eight sitting cases; or two field litters and four sitting cases; or one Bomgardner, one field litter and four sitting cases.

## Section II. INSTRUCTION IN AMBULANCE LOADING AND UNLOADING

### 88.- General

Ambulance loading and unloading, done by formal commands, is only for instructional purposes. It teaches men to work smoothly as a team with each man knowing exactly what his particular job is. In the following description of this training, formal commands are given and the men are numbered in order to show what each man does. Details of the actual loading and unloading will vary slightly, depending on the number of bearers, on the presence or absence of an ambulance orderly, and on the type of ambulance employed. Demonstration of the steps in ambulance loading and unloading, followed by application, is the recommended method of instruction.

### 89. General Rules

*a. Berths and Order of Loading.* The four longitudinal spaces formed within the truck,  $\frac{3}{4}$ -ton, 4 x 4, ambulance, M 43, are known as berths and are designated right (left) upper (lower). When the truck,  $\frac{1}{4}$ -ton, 4 x 4, is equipped with a litter securing bracket, the two berths within the truck are designated the right and left berths, respectively.

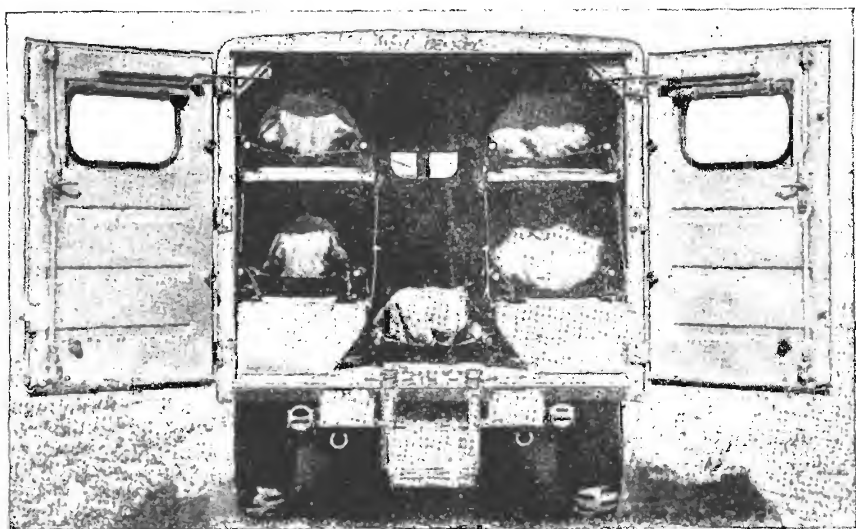


Figure 134. Four litter ambulance, showing how five litters may be arranged (in emergency only).

*b. Casualties With Splints.* When the situation permits, casualties with cumbersome splints are loaded in lower berths.

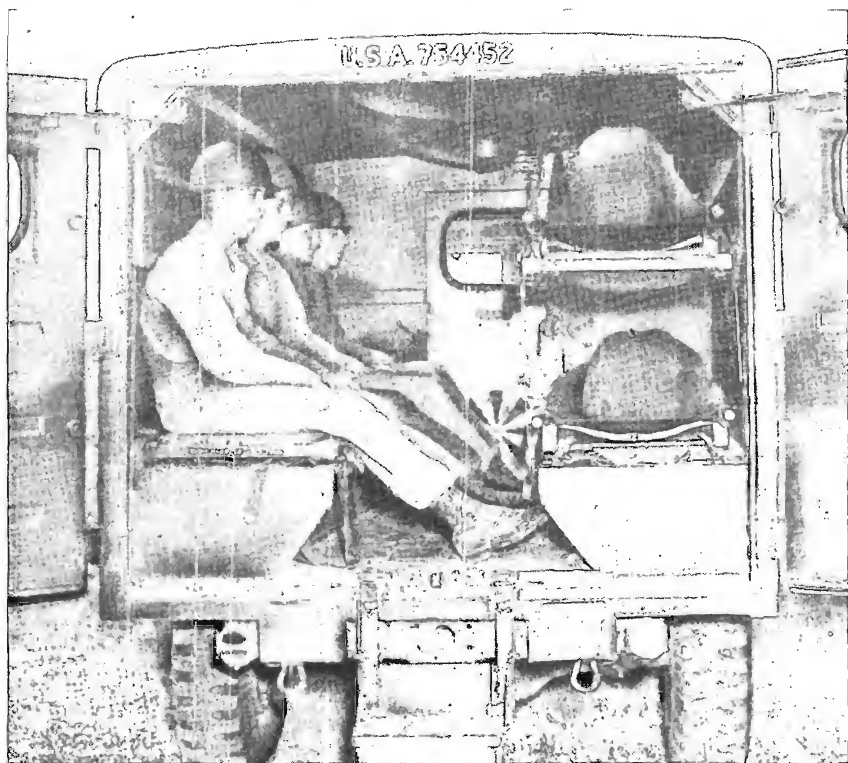
*c. Position of Casualty in Ambulance.* Unless otherwise indicated, litter cases are loaded head first. Prior to loading litters are grounded three paces to the rear of, and with the casualty's head toward, the ambulance.

#### **90. Loading Truck, $\frac{3}{4}$ -Ton, 4 x 4, Ambulance, M 43**

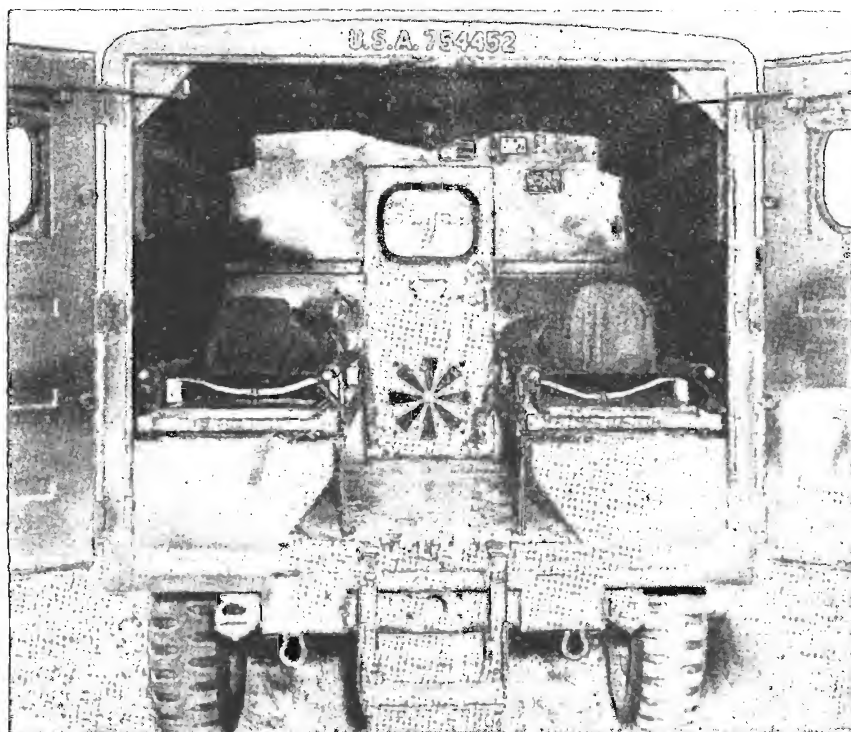
*a. General.* A squad of three men is needed to load or unload this ambulance. Four litter casualties is the normal capacity of the ambulance. In an emergency, however, one additional litter casualty may be carried on the floor (fig. 134). When both litter and sitting cases are to be carried, they are loaded as in figure 135. When only two litter casualties are to be carried, the lower berths are utilized (fig. 136).

*b. To Load the Ambulance.*

- (1) The first command is: 1. Ambulance, 2. POSTS. At the command POSTS, the members of the squad fall in, alining themselves in numerical sequence from left to right, one pace in the rear of and facing the ambulance (fig. 137).



*Figure 135. Two litter and four sitting casualties in ambulance.*



*Figure 136. Two litter casualties in ambulance.*



*Figure 137. Squad at ambulance, POST.*



*Figure 138. Opening doors.*

- (2) The second command is: 1. Prepare Ambulance For, 2. **LOADING**. At this command, No. 1 man performs the following duties:
  - (a) Opens the rear doors (fig. 138).
  - (b) Lowers the rear step (fig. 139).
  - (c) Raises the back rests and latches them in place.
  - (d) Raises the front of the seats and attaches them to the partition between the body and the cab to form the upper berths (fig. 140). The ambulance is now ready for loading and No. 1 man resumes his place with the remainder of the squad.
- (3) The third command is: 1. Right Upper Berth Prepare to Load, 2. **LOAD**. At the preparatory command, bearers take positions as follows: No. 2 man at foot of litter and facing the casualty, stoops and grasps handles; men Nos. 1 and 3, one on each side of the litter and facing the casualty's shoulders, grasp the left and right poles, respectively (fig. 141). At the command **LOAD**, the litter is lifted and car-

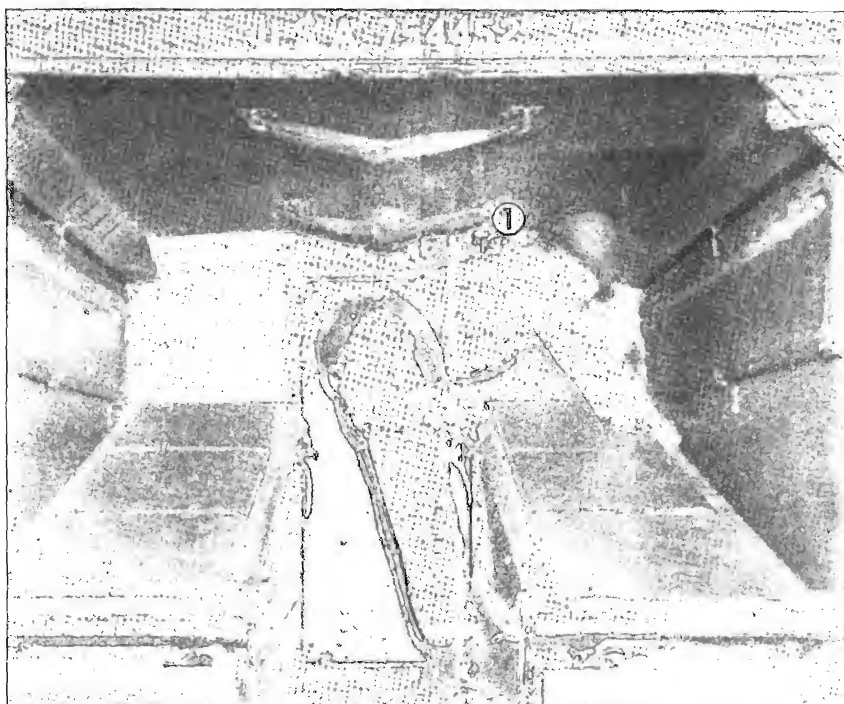


*Figure 139. Lowering step.*

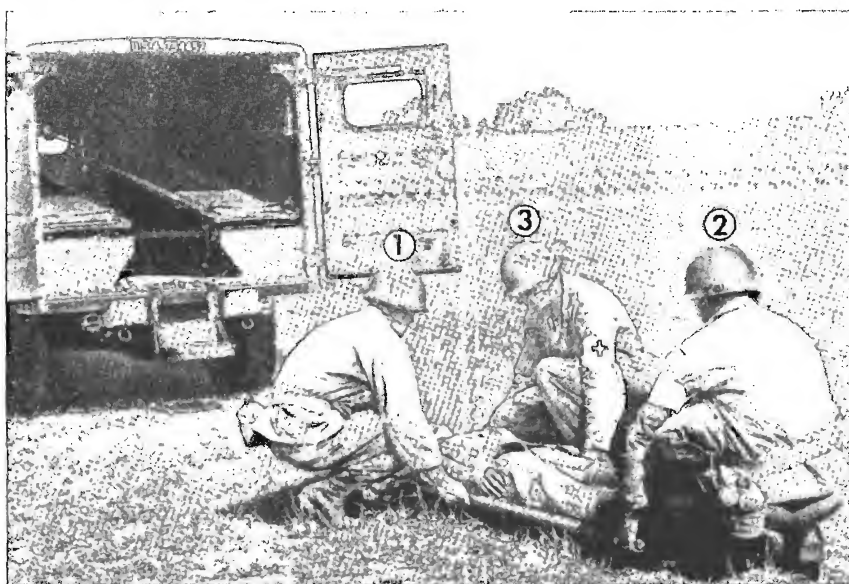
ried to the ambulance. The front stirrups are placed in the grooves of the inclined upper berth (fig. 142) and the No. 2 man slides the litter up onto the berth (fig. 143), pulls out the berth rods and raises them so that the upper berth with its litter is level, then pushes the berth rods into their recesses to lock the berth in place (fig. 144); No. 1 man then enters the ambulance and secures each litter handle with the strap that is attached to the berth for that purpose. He also fastens the roof straps to the upper berth (fig. 145). The squad then reassembles without command, as described in (1) above.

- (4) The right lower berth is then loaded at the command: 1. Right Lower Berth Prepare to Load, 2. LOAD. The litter is slid into place (fig. 146), and the handles are secured by straps as before. The left side of the ambulance is then loaded in a similar manner.





*Figure 140. Raising seat to form upper berth.*



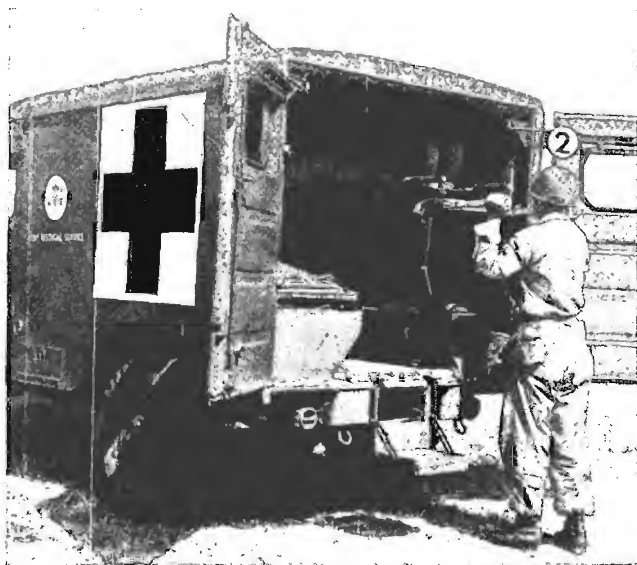
*Figure 141. Right upper berth, prepare to LOAD.*



*Figure 142. LOAD.*



*Figure 143. No. 2 man sliding litter into right upper berth.*



*Figure 144. No. 2 man raising right upper berth into place.*



*Figure 145. No. 1 man fastening straps to secure litters.*

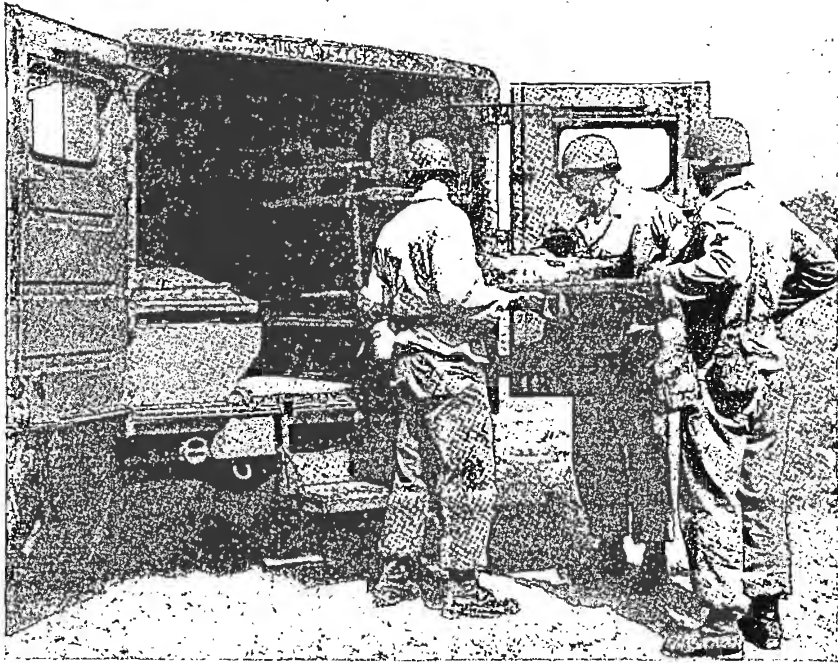


Figure 146. Loading right lower berth.

- (5) When loading is completed, No. 1 man raises the rear step (which forms a seat) and closes the rear doors. The loading squad then resumes positions, as described in (1) above, without command.

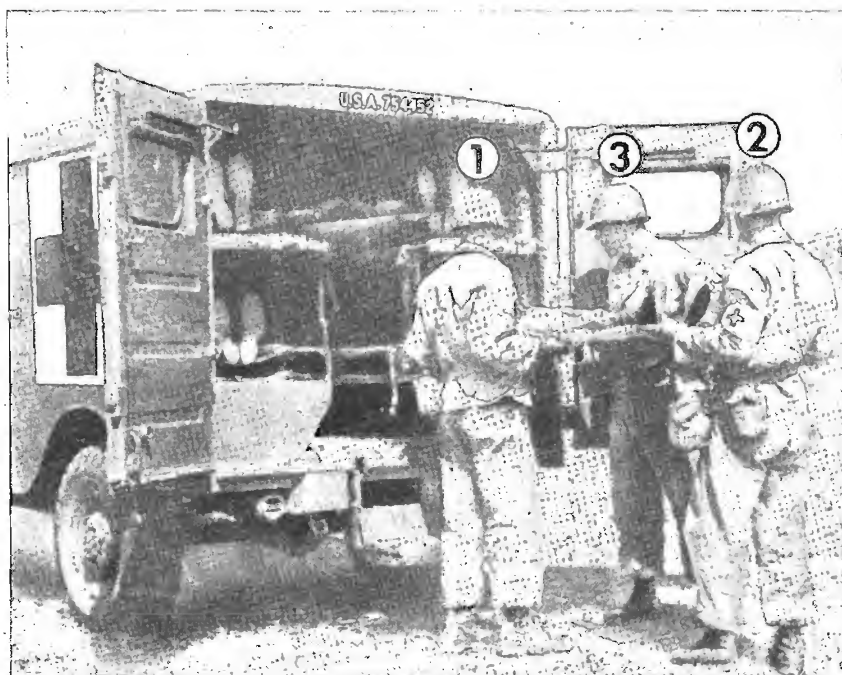
*c. To Unload Ambulance.* To unload ambulance, the command is: 1. Prepare Ambulance For, 2. UNLOADING. At this command, No. 1 man opens the rear doors, lowers the rear step, enters the ambulance and releases the front straps securing the litters, and the front roof straps. Meanwhile, men Nos. 2 and 3 release the rear straps securing the litters, and the rear roof straps. When this is accomplished, the squad resumes its normal position without command (fig. 147). To proceed with unloading, the command 1. Right Lower Berth Prepare to Unload, 2. UNLOAD, is given. At the first command, No. 2 man grasps the rear handles of the litter in the right lower berth while men Nos. 1 and 3 take their places on either side (fig. 148). At the command UNLOAD, No. 2 man pulls the litter from the berth while men Nos. 1 and 3 grasp the litter poles toward the head as the litter slides out (fig. 149). The three men remove the litter at least three paces from the ambulance and deposit it on the ground (fig. 150). The squad then resumes its normal position without command. When the command, "Right upper berth prepare to unload," is given,



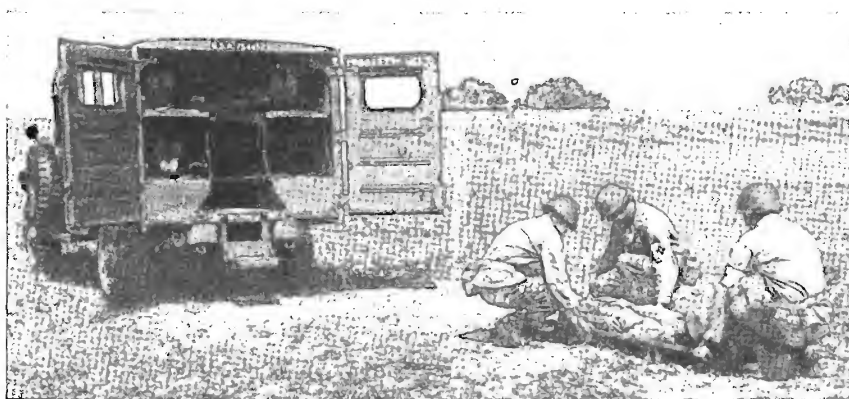
*Figure 147. Squad at Ambulance Post ready to unload ambulance.*



*Figure 148. Right lower berth, prepare to unload.*



*Figure 149. UNLOAD.*



*Figure 150. Depositing casualty three paces to the rear of ambulance.*



Figure 151. No. 2 man lowering upper berth preparatory to unloading.

No. 2 man steps forward, pulls out the rods of the upper berth, No. 1 man collapses the upright supports, and the No. 2 man then lowers the berth to unloading position (fig. 151). At the command UNLOAD, No. 2 man pulls out the litter; men Nos. 1 and 3 grasping it as before. The left side is unloaded similarly.

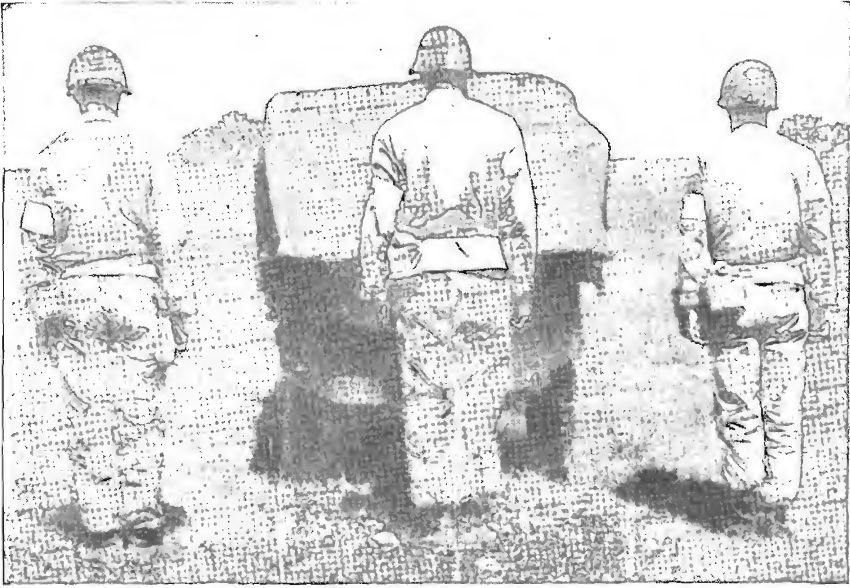
#### 91. Truck, ¼-Ton, Fitted With Litter Securing Bracket

*a. General.* A squad of three men is required to load or unload the ¼-ton truck fitted with litter securing bracket.

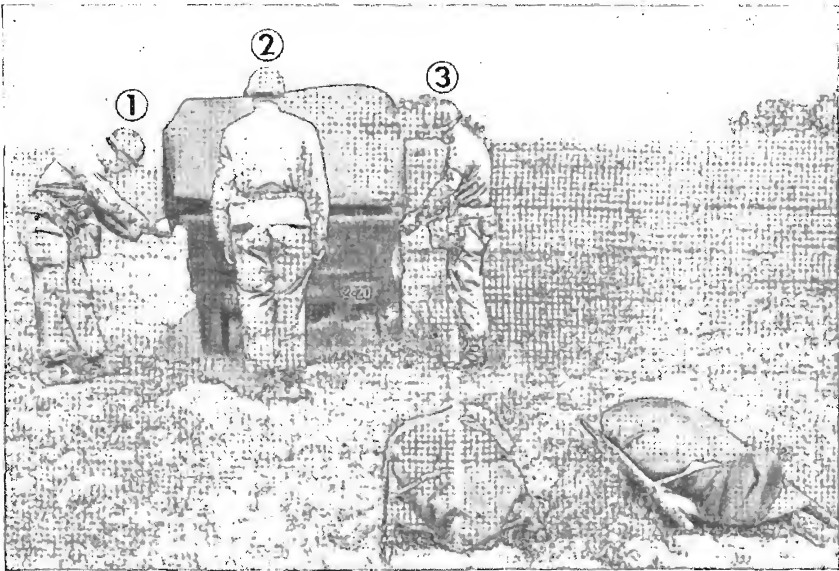
*b. To Load the Vehicle:*

- (1) The command is: 1. Ambulance, 2. POST. At the command POST, the squad falls in line, alining itself in numerical sequence from left to right, one pace in the rear of and facing the vehicle (fig. 152).
- (2) The second command is: 1. Prepare Ambulance for, 2. LOADING. At the command LOADING, men Nos. 1 and 3 step forward and untie the ropes that secure the back of the top (fig. 153), and turn the top back over the back bow (fig. 154).





*Figure 152. Ambulance, POST.*



*Figure 153. Prepare Ambulance for, LOADING (Unfastening top).*



Figure 154. Prepare Ambulance for, *LOADING* (Turning top back).

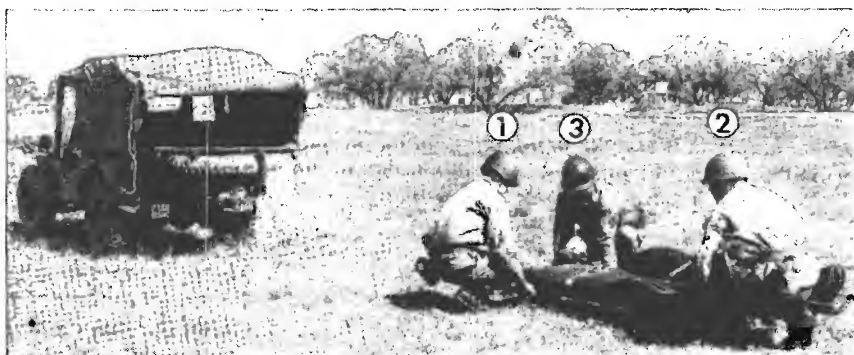


Figure 155. Right Berth Prepares to, *LOAD*.

- (3) The third command is: 1. Right Berth Prepare to Load, 2. *LOAD*. At the preparatory command the squad takes position as follows: No. 2 man at the foot of the litter facing the casualty; he stoops and grasps the litter handles. Men Nos. 1 and 3 on each side of the litter facing casualty's shoulders; they stoop, grasping the right and left poles, respectively (fig. 155). At the command of execution, the litter is lifted and carried to the ambulance, the front stirrups are placed in the grooves of the right berth of the litter securing bracket, and No. 2 man pushes the litter into the berth. No. 3 man enters the vehicle from the right side and, if necessary, assists No. 2 man in getting the litter completely into the berth (fig. 156). Men Nos. 2 and 3 secure the litter

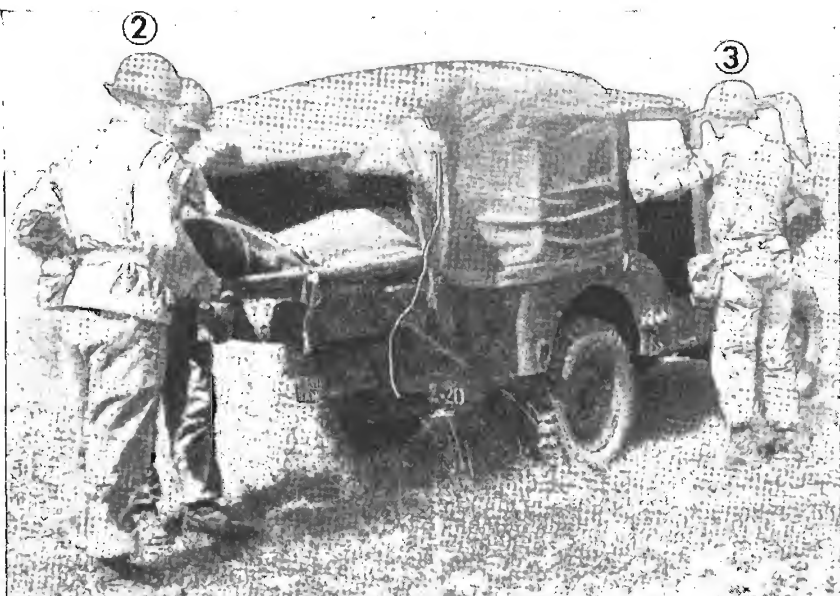


Figure 156. *LOAD.* (No. 3 man enters vehicle and assists in loading right berth.)

to the litter securing bracket. The squad then reassembles without command, as shown in (1) above.

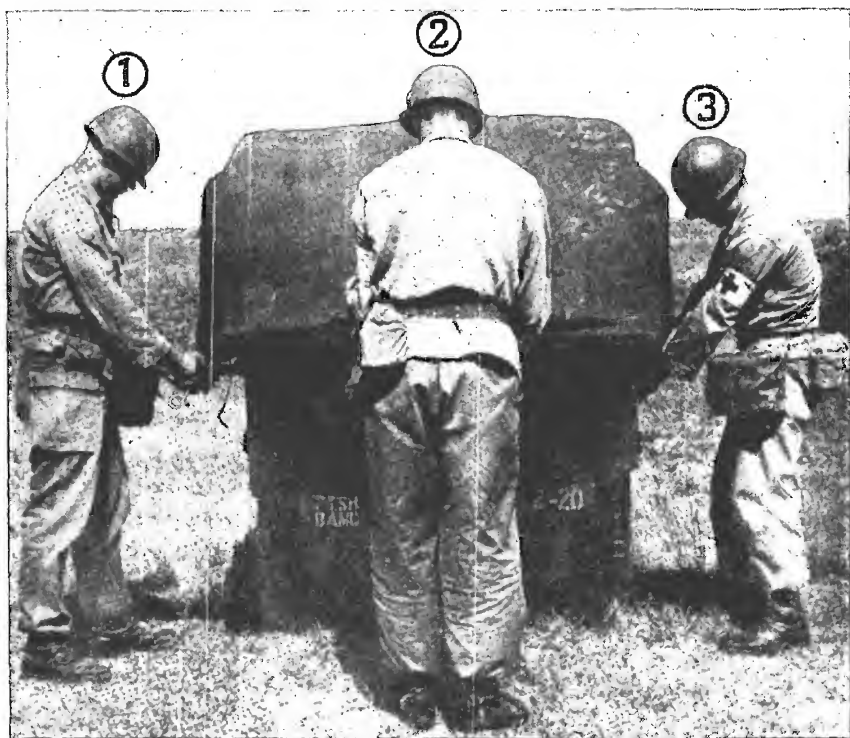
- (4) The left berth is loaded in a similar manner. The command is: 1. Left Berth Prepare to Load, 2. **LOAD.** At the command of preparation the procedure is identical with that outlined in (3) above. At the command of execution the litter is carried to the vehicle, the front stirrups are placed in the grooves of the litter securing bracket, and No. 2 man pushes the litter into the berth. In loading the left berth, No. 1 man proceeds to the front of the vehicle and, if required, assists No. 2 man in getting the litter into the berth. No. 1 man secures the head of the litter to the litter securing bracket (fig. 157).
- (5) When loading is completed, men Nos. 1 and 3 pull the top down, bring it over the litter handles which extend from the rear end of the truck, and tie it securely to the back end of the truck.

*c. To Unload the Vehicle.*

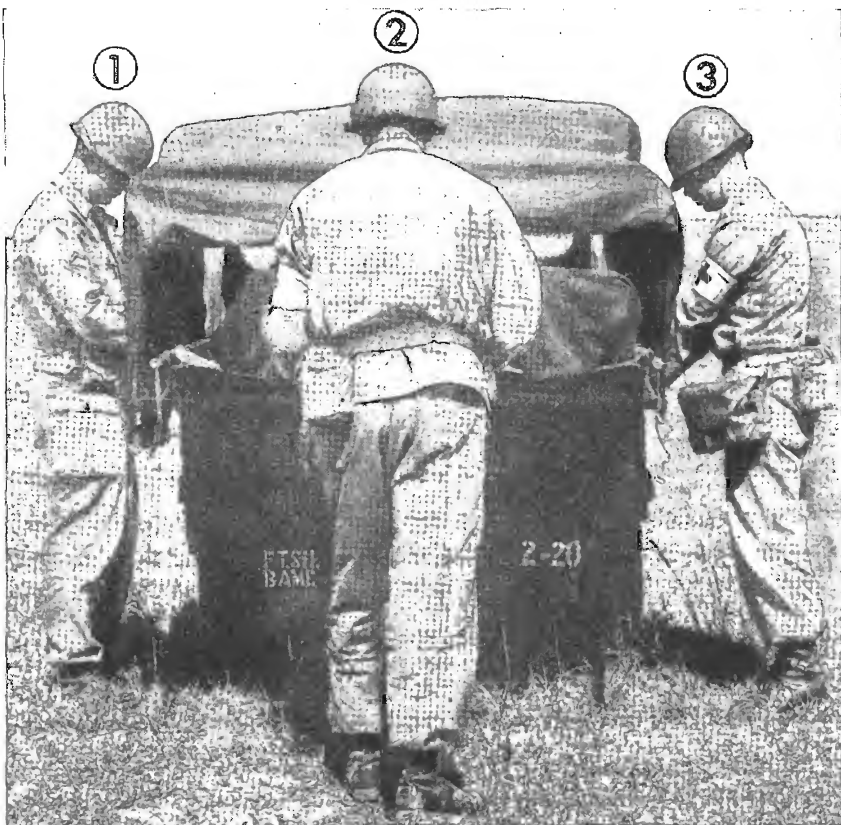
- (1) The first command is: 1. Ambulance, 2. **POSTS.** At the command **POSTS**, the squad falls in as described in *b*(1) above.
- (2) The second command is: 1. Prepare Ambulance for, 2. **UNLOADING.** At the command **UNLOADING**, men Nos. 1 and 3 step forward and untie the ropes that are securing the top, and fold the top back of the rear bow (fig. 158).



*Figure 157. Loading left berth, No. 1 man enters vehicle and assists in loading.*



*Figure 158. Prepare Ambulance for, UNLOADING. (Men Nos. 1 and 3 unfastening top.)*



*Figure 159. Prepare Ambulance for, UNLOADING. (Men Nos. 1 and 3 unfastening straps securing head of the litters. No. 2 man unfastening straps securing foot of litters.)*

Men Nos. 1 and 3 then proceed to the left and right hand sides of the vehicle, respectively, and release the straps that are securing the front of the litters. No. 2 man releases the straps that are securing the foot ends of the litters (fig. 159). When this is accomplished, the squad reassembles without command, as in (1) above.

- (3) The third command is: 1. Right Berth Prepare to Unload, 2. UNLOAD. At the preparatory command No. 2 man grasps the handles of the litter in the right berth, and men Nos. 1 and 3 take their places on either side (fig. 160). At the command UNLOAD, No. 2 man pulls the litter from the berth while men Nos. 1 and 3 grasp the litter poles toward the head end as it slides out. The three men remove the litter at least three paces from the vehicle and place it on the ground. The squad then resumes, without command, the positions described in (1) above.



*Figure 160. Right Berth Prepare to Unload, UNLOAD.*

- (4) The left berth is unloaded in the same manner as the right, the command being: 1. Left Berth Prepare to Unload, 2. UNLOAD.
- (5) When the unloading is complete, men Nos. 1 and 3 secure the ropes that hold the top, and the squad reassembles as described in (1) above.

## **92. Loading Bus, 36 Passenger, 4 x 2, Integral Type**

*a. Conversion.* All necessary accessories for converting the bus into a bus ambulance are contained in the conversion kit located over the rear door of the bus.

- (1) To convert the bus for the transportation of the maximum number of litter casualties all the seats except the seat immediately behind the driver's seat are removed. The seat immediately behind the driver's seat may be left in place to accommodate two attendants, or two ambulatory patients. After the seats have been removed, 36-litter support hooks are inserted into the sockets located along the sides of the bus body and 12-litter supporting straps are suspended from the longitudinal ceiling rails. To reinforce the longitudinal ceiling rails to which the litter supporting straps are attached, four litter support stanchions are installed. The bus thus converted can accommodate 18 litter casualties and two attendants or ambulatory casualties (fig. 161).
- (2) When the bus is to be converted without removing the seats, only 24 litter support hooks are inserted along the sides of

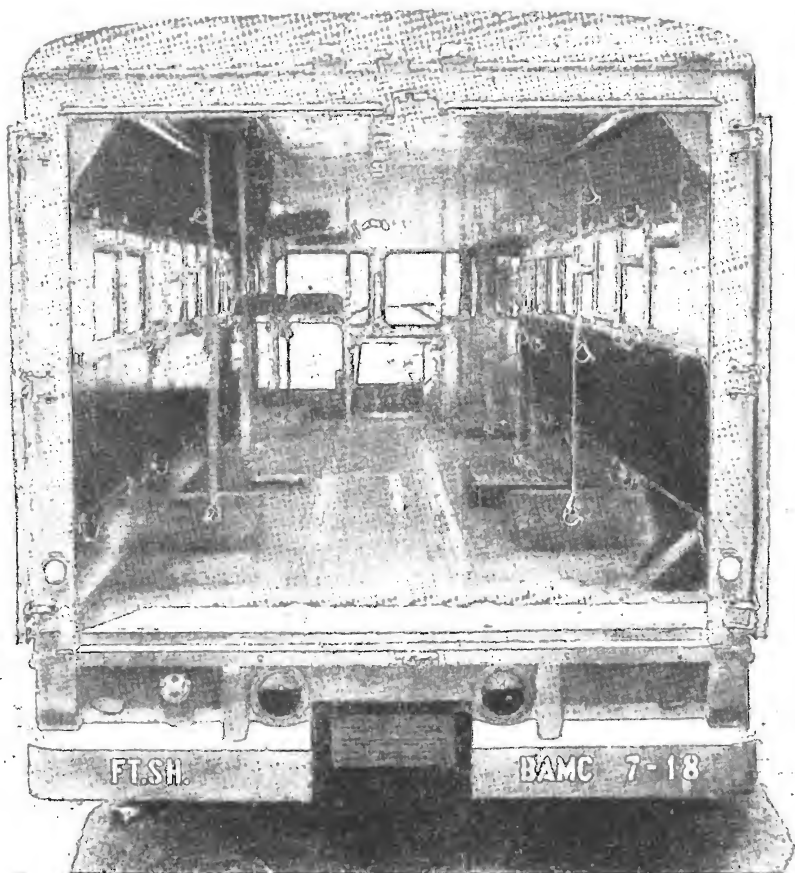
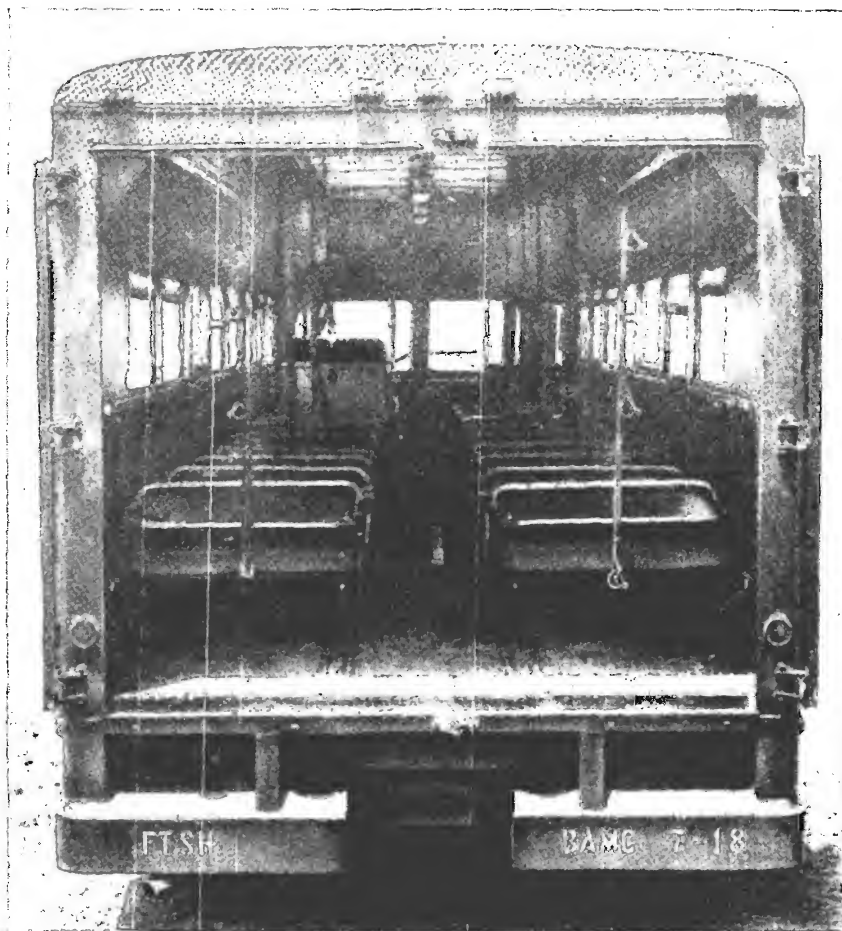


Figure 161. Bus converted to accommodate 18 litter casualties by removing the seats.

the bus body to accommodate the upper and middle tiers of litters. The 12-litter support straps and 4-litter support stanchions are installed as indicated in (1) above. The bus thus converted accommodates 12 litter casualties and two attendants or ambulatory casualties (fig. 162).

- (3) When both ambulatory and litter casualties are to be transported, only 12-litter support hooks are installed to accommodate the upper tier litters. The 12-litter support straps are suspended from the longitudinal ceiling rails and folded so as not to interfere with the ambulatory casualties occupying the seats below the litters. The litter support stanchions are not installed for this conversion.

*b. Loading.* Two litter squads of three men each are required to load or unload the bus ambulance. Unless contraindicated by the nature of the casualty's injuries, all casualties are loaded into the bus

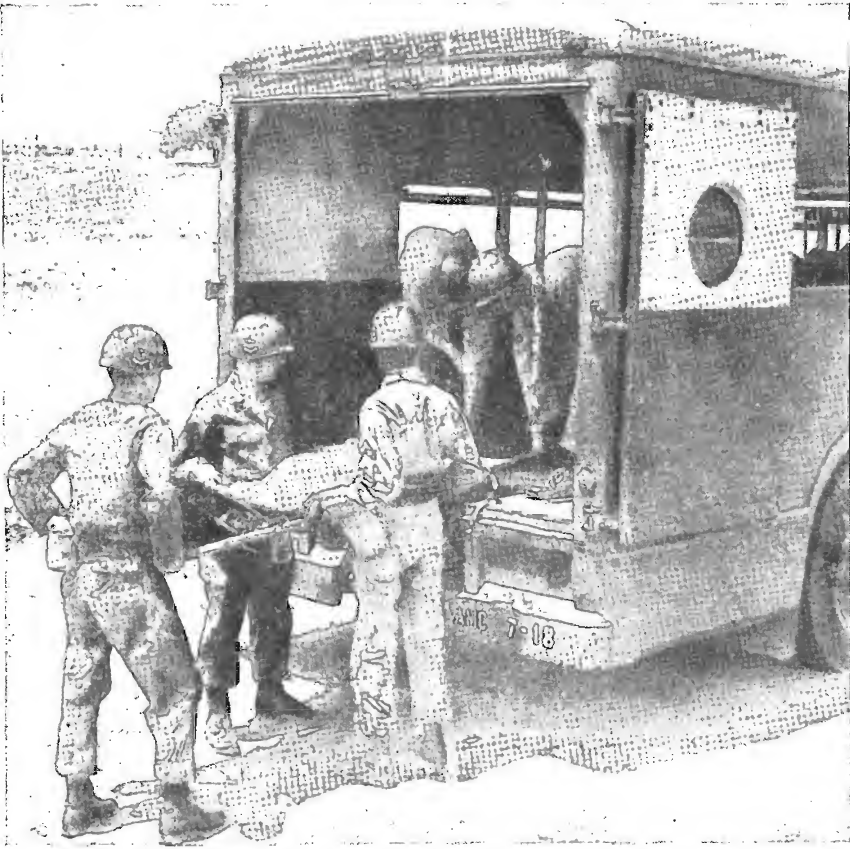


*Figure 162. Bus converted to accommodate 12 litter casualties without removing the seats.*

with the casualty's head to the front. The bus is loaded from the front to the rear and from top to bottom.

- (1) When casualties are loaded into the bus from loading ramps or platforms, one litter team enters the bus with a litter casualty through the rear of the bus, loads the litter casualty on the appropriate berth and exits through the front entrance of the bus as the other litter team enters the rear of the bus with another litter casualty. After the second litter team has loaded its casualty, it exits through the front entrance of the bus as the first litter team is entering the rear of the bus with its second casualty. If this procedure is followed, only one litter team is in the bus at any given time thereby avoiding one litter team interfering with the other in the cramped interior of the bus.





*Figure 163. Loading casualties on bus ambulance where loading ramps or platforms are not available.*

- (2) When casualties are to be loaded from ground level without the aid of loading ramps or platforms, one litter team remains on the bus loading casualties from the floor of the rear of the bus onto the appropriate berths. The second litter team loads the casualties onto the floor of the rear of the bus where they are picked up by the litter team remaining on the bus (fig. 163).
- (3) Casualties are unloaded in inverse order in which they were loaded. The bus is unloaded from the rear to the front, and from the bottom to the top. When the bus is to be unloaded at an installation having a loading ramp or platform, the two litter teams alternate in unloading. If casualties are to be unloaded at an installation not having a loading ramp or platform, one litter team removes the litter casualties from the berths in the bus and places them on the floor at the rear of the bus where they are picked up and unloaded by the second litter team.

## CHAPTER 6

### CONVERSION OF MILITARY VEHICLES TO CASUALTY CARRIERS

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#### 93. General

*a.* Many common military vehicles can be converted into casualty carriers with little or no structural change. Often in combat areas, ambulances will be unavailable, too few in number, or incapable of evacuating certain regions due to the tactical situation or to difficulties arising from the terrain. In such cases it becomes necessary to utilize whatever vehicles are available to transport the wounded. Methods of using several of the more common military vehicles to carry casualties are described in this chapter.

*b.* Most of these vehicles are not inclosed. In order to insure that casualties do not bounce off the litters while in transit they should always be secured to the litters prior to being loaded on the vehicles.

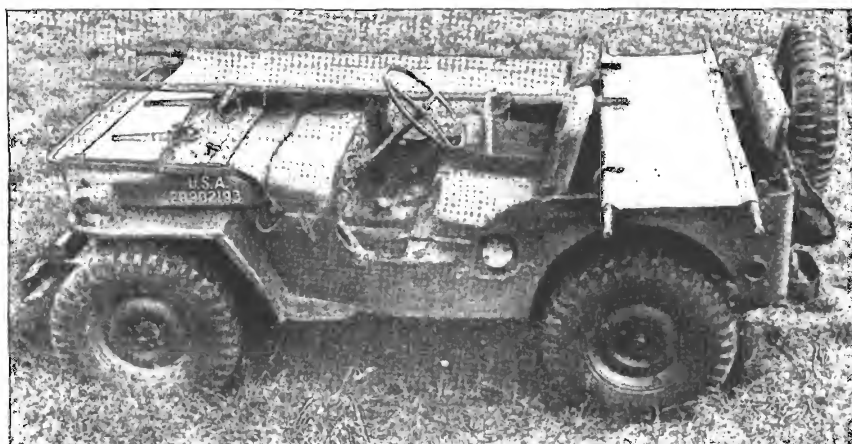
*c.* To insure that the litters themselves will not bounce off the vehicles it is necessary that they be lashed securely to the sides of the vehicles after being loaded. For this purpose lengths of rope, litter straps, or any other convenient materials may be used.

*d.* In general, litters are loaded as follows: When the litters are loaded lengthwise to the vehicle, the casualties' heads are normally placed to the front; when the litters are loaded crosswise, the casualties' heads are placed alternately to the right and to the left, in order to minimize the discomfort resulting from cases of nausea and vomiting.

#### 94. Truck, ¼-Ton, With Trailer, ¼-Ton

The ¼-ton truck with the ¼-ton trailer are standard equipment of the medical company as well as of many other units of the Army. They are generally available and are easily adapted to carrying casualties.

*a.* Two litter casualties can be carried on the ¼-ton truck without need of alteration to the vehicle or use of additional equipment (fig. 164). One litter is placed across the back of the truck, the handles of the litter resting on the truck sides. The second litter is placed lengthwise on the right side of the truck. The rear handles of the second litter rest on the side of the first litter, and the front stirrups fit into the groove below the windshield. This method is satisfactory in open



*Figure 164. The 1/4-ton truck with two litters.*



*Figure 165. Improvised sapling frame for 1/4-ton truck.*

terrain; however, when the route of evacuation is along narrow roads or trails, care should be taken to see that the handles of the crosswise litter do not catch on trees and bushes.

*b.* Another method is to improvise a pole or sapling frame to permit the carrying of two litter casualties lengthwise on the rear of the truck. Such a frame can be made by binding together four poles, saplings, or boards in the shape, roughly, of a two rung ladder (fig. 165). The frame is lashed to the truck with ropes or straps. The litters are loaded with the casualties' heads placed toward the front (fig. 166).

*c.* The 1/4-ton cargo trailer may readily be adapted to the transportation of litter casualties (fig. 167). Two litters are placed lengthwise on the trailer. The handles of the litters are bound to the small hooks on the sides of the trailer body.

*d.* By attaching the loaded 1/4-ton cargo trailer to the 1/4-ton truck, four casualties may be transported. Ordinarily, the method of litter loading described in *a* above, must be used to load the 1/4-ton truck as use of either the improvised frame or the litter securing bracket on the rear of the truck would make it impossible to attach the trailer.



*Figure 166. Two litters loaded on improvised sapling frame.*

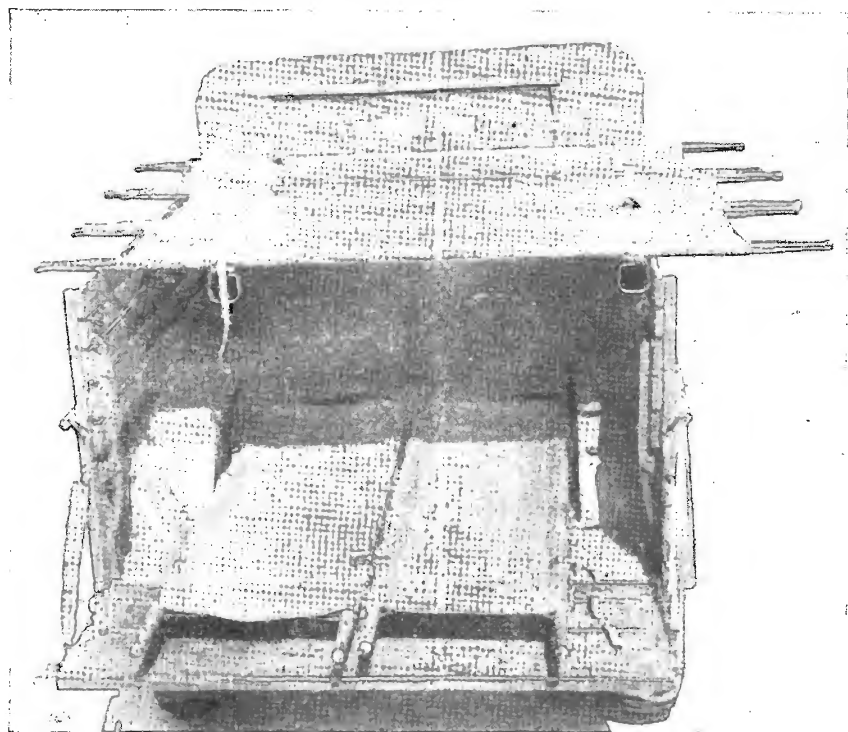


*Figure 167. 1/4-ton truck and 1/4-ton trailer with two litters each.*

## **95. Truck, 3/4-Ton, and Truck, 1 1/2-Ton, 6 x 6**

a. The 3/4-ton cargo truck (M 37), a common vehicle for almost all units, is easily adapted for use as a casualty carrier. Two litters are placed lengthwise, head foremost, in the bottom of the 3/4-ton truck. The litter ends protrude and are supported by the tail gate. The protruding ends are bound with ropes to prevent the litters from sliding out. The roof bows of the truck are removed and a second layer of three litters is placed side by side, crosswise, resting on the bow braces. The litters of the top layer are secured by lashing the handles to the bow braces (fig. 168); thus, a total of five litter casualties can be transported.

b. The 1 1/2-ton, 6 x 6 truck is loaded similarly; that is, two litters are placed lengthwise along the floor and a second layer is placed crosswise over the bow braces. Because of the additional length of the truck body, five litters can be accommodated on the second layer, making a total of seven litter casualties that can be carried in the truck.



*Figure 168. 3/4-ton truck loaded with five litters.*

#### **96. Truck, 2 1/2 -Ton**

The 2 1/2-ton truck is loaded similarly to the 1 1/2-ton truck but has a greater capacity. The upper, middle, and bottom layers are again placed on the bow braces, on the seats, and on the floor, respectively. The floor of the truck will accommodate four litters, in two rows of two litters each, loaded lengthwise to the truck. The last two litters protrude from the floor of the truck and are supported by the tailgate, which cannot be closed. The entire truck is loaded from front to rear in any convenient order, care being taken not to obstruct the placing of one litter by the premature loading of another. Finally, the litters are bound securely to the bow braces, and the tailgate is raised slightly above the horizontal to prevent sliding. When fully loaded, the truck permits transportation of 16 litter casualties (fig. 169).

#### **97. Truck, Amphibian, 2 1/2 -Ton**

The 2 1/2-ton amphibian truck (DUKW) may also be adapted as a casualty carrier. This vehicle is usually available only to troops engaged in or contemplating amphibious operations. It is most useful in transferring casualties from shore landing parties to ships



*Figure 169. The 2½-ton truck loaded with 16 litters.*

nearby. The same truck that brings supplies to the shore may carry wounded men back to the ship. The truck may be loaded at the unit aid station and then driven down to the shore and out to the ship, or it may be loaded at the water's edge. Six litters can be placed on the bottom of the truck, two crosswise in front and four lengthwise in the rear (fig. 170). In order to rest litters on the sides of the truck, thus making a second layer, it is necessary to construct a rail along each side of the truck just outside and above the side (fig. 171). This rail is held in place by a special bracket which clips on the side of the truck. When litters are placed across the sides of the truck their handles abut against the rail, thereby preventing the litters from sliding off. Six litters can be loaded side by side across the top. The capacity of the truck, fully loaded, is 12 litter casualties, 6 on the bottom and 6 on top. All litters must be tied securely in place so that they will not slide around nor be displaced by the rocking of the truck in rough water.

#### **98. Cargo Carrier, M29C ("Weasel")**

Tracked vehicles of this class can be converted to casualty carriers for operations over marshes, snow and ice. These vehicles are small, but they are valuable in Arctic operations. In warm weather litters can be carried crosswise on the body of the vehicle. In low temperatures a special top must be improvised and a heater installed to prevent casualties from suffering unduly. When a top and a heater are added, the capacity of the carrier is one litter and two ambulant casualties (fig. 172).

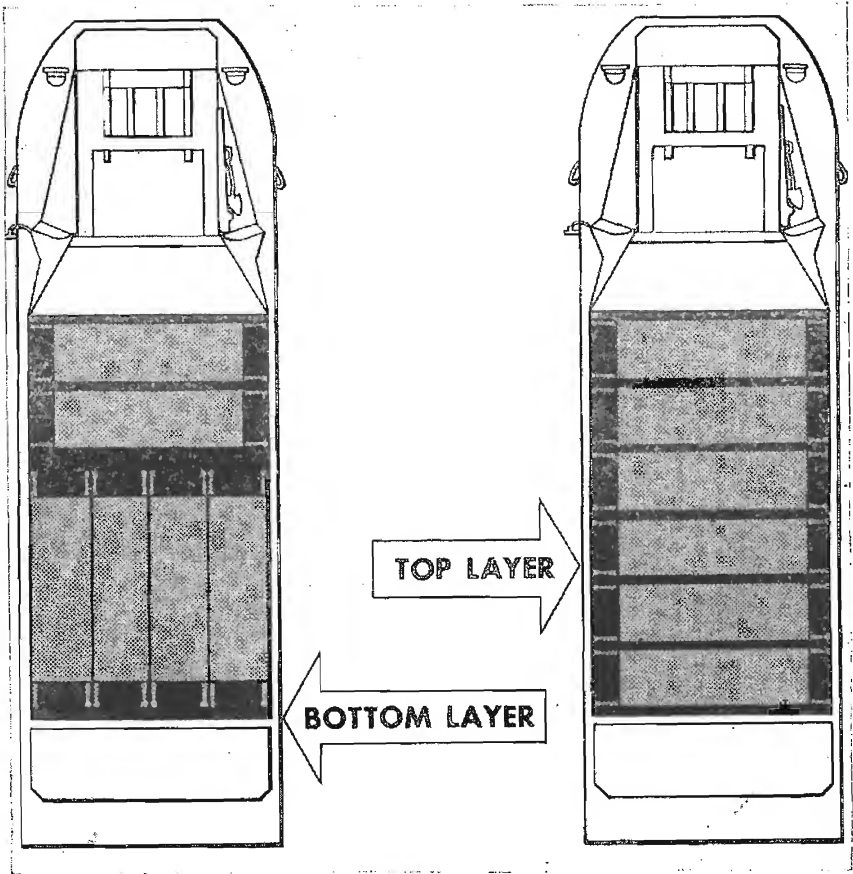


Figure 170. Plan for loading litters on the 2½-ton amphibian truck.

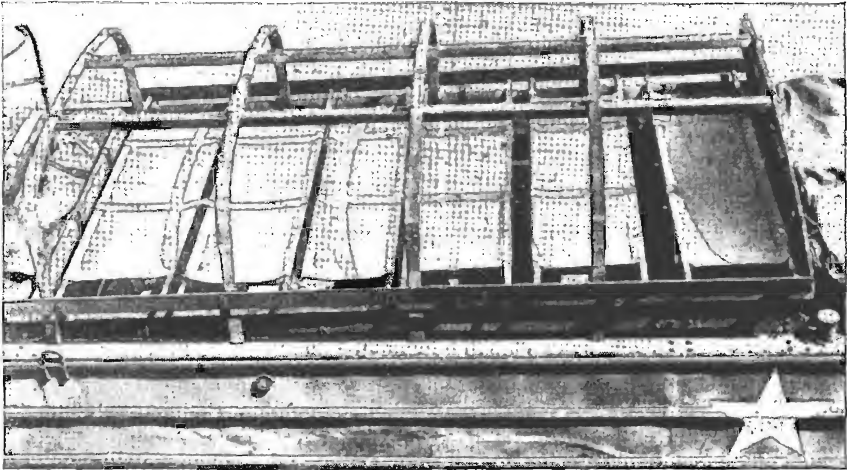
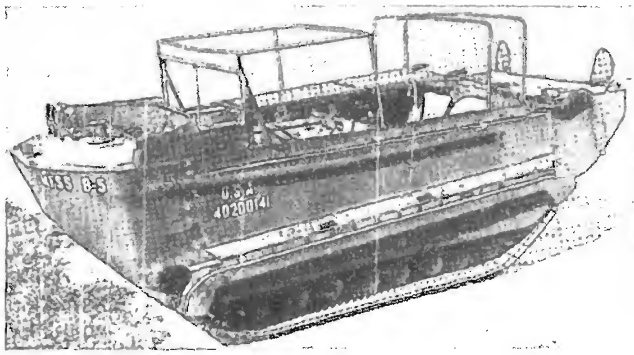


Figure 171. Top layer of litters held in place by side rails.



*Figure 172. Cargo Carrier M29C with one litter and space for two ambulant casualties.*

### **99. Armored Personnel Carriers**

Several half-track and full-track vehicles are in use at the present time. The half-track can be used by making structural changes so that litters can be suspended lengthwise inside the body. If this is not possible, litters are placed across the top and lashed in place; an additional litter may be carried inside the body of the carrier. Full-track vehicles carry litters on the floor. Personnel carriers with folding armored tops carry litters across the top.



## CHAPTER 7

### RAIL TRANSPORTATION

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#### 100. General

*a.* Ambulance trains are trains that are constructed or converted for rail transportation of the sick and wounded. The Army Medical Service is responsible for the staffing of medical personnel and the medical equipment for such trains. It is also responsible for the administration, training, and discipline of medical personnel assigned to ambulance train duties, the welfare and safety of patients being transported, and maintenance of equipment used in patient care. The Transportation Corps is charged with the procurement of necessary rail rolling stock to meet rail evacuation requirements established by the Army Medical Service, the maintenance of such equipment, and for all rail operations relative to the movements of ambulance trains. Ambulance trains may be operated over commercial or Army-controlled railroads.

*b.* In the zone of the interior, ambulance trains are employed in the movement of patients from various debarkation points to Armed Forces hospitals and in the transfer of patients between medical treatment facilities. In a theater of operations, they are used to evacuate patients to transfer and/or embarkation points within the combat and communication zones.

#### 101. Standard Ambulance Trains

*a.* Standard ambulance trains, operating under the prescribed TOE or TD, are employed in the zone of the interior and in a theater of operations. Standard ambulance cars have been designed to operate as follows:

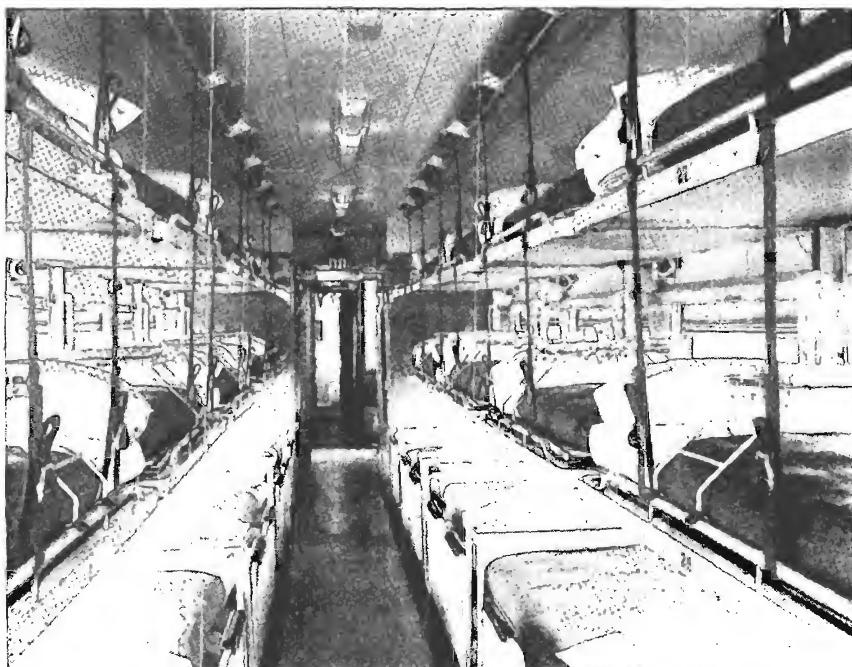
- (1) Ambulance unit car—standard 56½-inch gage.
- (2) Wide gage ambulance cars—56½-, 60-, 63- and 66-inch gage.
- (3) Narrow gage ambulance cars—36-, 39¾- and 42-inch gage.

*b.* The number of cars included in an ambulance train may vary depending upon available locomotive power, number and type of patients being transported, and the number of medical personnel required to care for patients enroute.

#### 102. Types of Ambulance Trains

##### *a. Zone of the Interior.*

- (1) In the zone of the interior, ambulance unit cars are used and operated over commercial railroads. Depending upon the



*Figure 173. Interior view of zone of interior ambulance unit car made up for nonambulatory patients.*

number of patients to be transported and the economical use of rolling stock, unit cars may be grouped to form an ambulance train or integrated independently into trains within the commercial rail system operating on regular schedule.

- (2) An ambulance unit car has 9 three-tiered berths accommodating 27 nonambulatory patients; 2 three-tiered berths for 6 medical enlisted personnel assigned to train duty; a separate compartment for a male officer and another for the nurse. All patient-berth spaces may be converted to seat 36 ambulant patients. Berth space for medical personnel may be converted to seat 8 individuals. One three-tiered section in the patient area is screened in such a manner as to permit the transportation of mental patients.
- (3) Equipment in the ambulance unit car includes a combination receiving room and nurse's station, partitioned toilets and lavatory, bedpan washer and sterilizer, cabinet space for storage of linens and baggage, and a kitchen equipped to prepare food and serve approximately 75 individuals. A common dressing room and shower is provided. Separate toilet facilities are provided for patients, officer male and female personnel. This car is airconditioned.

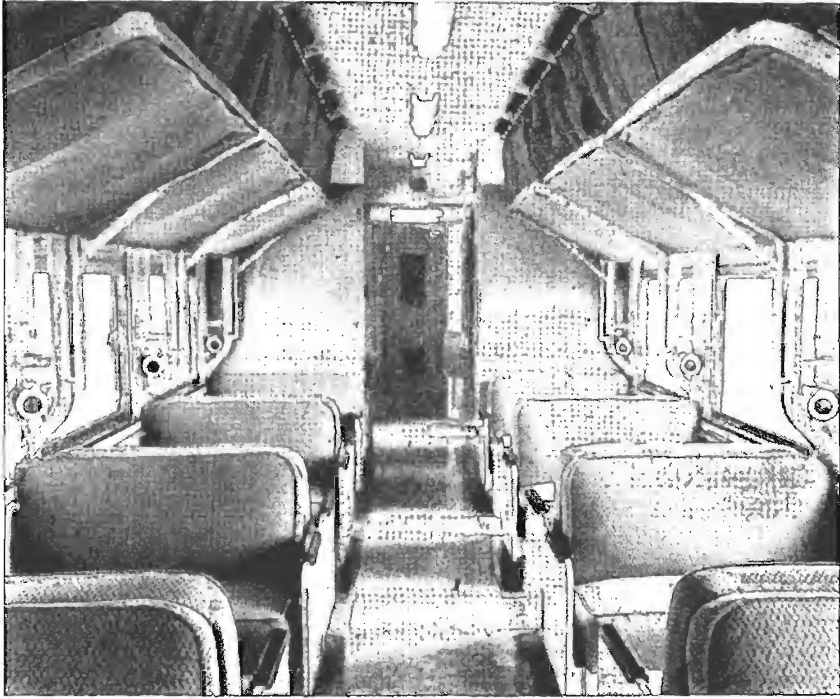


Figure 174. Interior view of zone of interior ambulance unit car made up for sitting patients.

b. *Theater of Operations (Wide Gage Rail)*. Standard ambulance train, theater of operations (wide gage) consists of 6 ambulance cars, 2 ambulance personnel cars, and 1 ambulance kitchen, dining and storage car (fig. 175).

- (1) *Ambulance car*. Each ambulance car has 6 double-tiered berths, and 6 three-tiered berths accommodating 30 nonambulatory patients. The 6 three-tier berth spaces can be converted to seat 24 ambulant patients. Equipment includes a combination receiving room and nurse's station, toilet rooms, bedpan washer and sterilizer, and sink. This car is airconditioned.
- (2) *Ambulance personnel car*. This car is divided into 2 compartments with double-tiered berths providing accommodations for 4 male officers; one compartment with a double-tiered berth for 2 nurses, and 5 compartments with three-tiered berths to accommodate 15 enlisted men. Separate toilet facilities are provided for male and female personnel. Common shower facilities for all personnel are provided in this car.

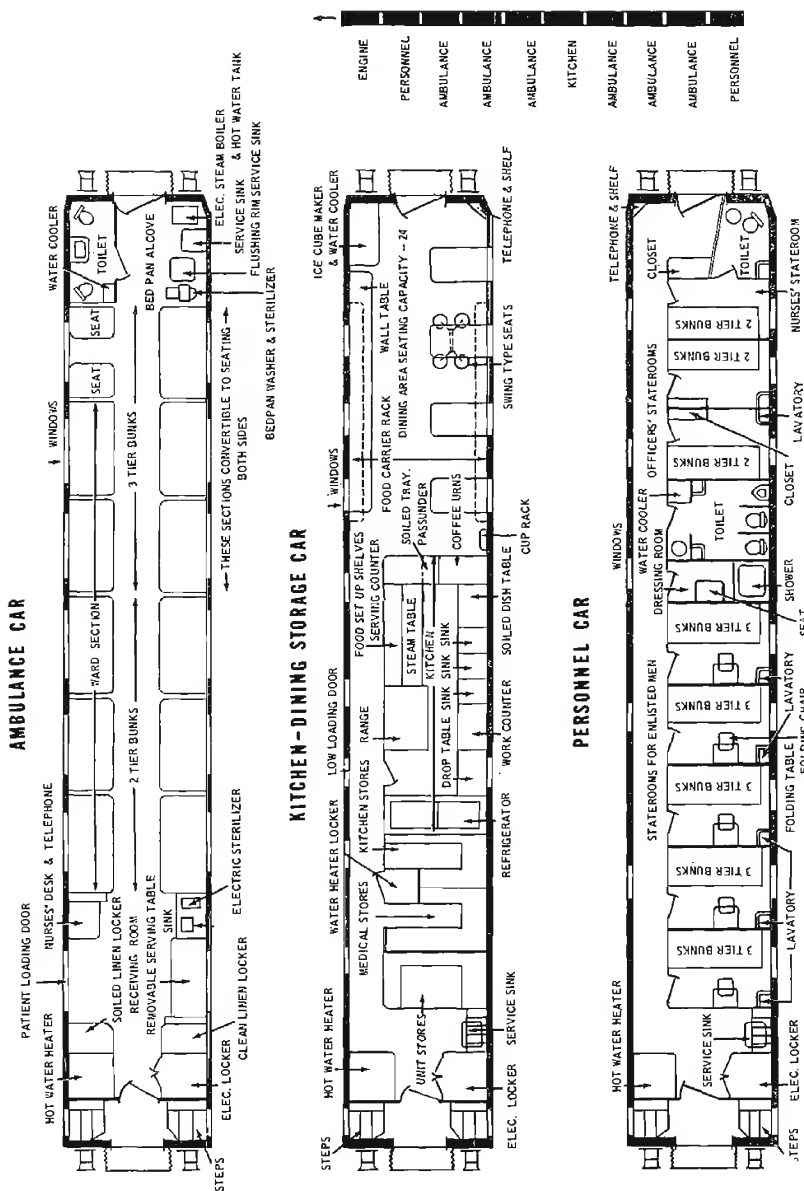


Figure 175. Plan of theater of operations standard ambulance train (Wide Gage Rail).

- (3) *Ambulance kitchen, dining, and storage car.* This car provides kitchen and food storage facilities for the preparation of meals for approximately 175 individuals, patients and ambulance train personnel. Tables are available to seat 24 individuals. Storage space is included in the car for medical and unit supplies and equipment.

*c. Theater of Operations (Narrow Gage Rail).* Standard ambulance train, theater of operations (narrow gage) consists of 6 ambulance cars, 2 ambulance personnel cars, and 1 ambulance kitchen, dining and storage car.

- (1) *Ambulance car.* Each ambulance car has 10 double-tiered berths, thus accommodating 20 nonambulatory patients. Four of the double-berth spaces can be converted to seat 16 ambulant patients. Equipment includes a combination receiving room and nurse's station, toilet rooms, bedpan washer and sterilizer, and sink. This car is airconditioned.
- (2) *Ambulance personnel car.* This car is divided into 2 compartments, one with a double-tiered berth for 2 male officers, one with a double-tiered berth for 2 nurses. One open section with 7 double-tiered berths to accommodate 14 enlisted men. Four of the double-tiered berths in the enlisted men's section can be converted to provide seats for 16 individuals. Common showers are provided for all personnel. Separate toilet facilities are provided for male and female personnel.
- (3) *Ambulance kitchen, dining and storage car.* This car provides kitchen and food storage facilities for the preparation of meals for approximately 175 individuals, patients and ambulance train personnel. Tables are available to seat 14 individuals. Storage space is included in the car for medical and unit supplies and equipment.

### 103. Nonstandard Ambulance Trains

*a.* In an emergency, practically any type of standard sleeper, chair or baggage car may be utilized for the transportation of the sick and wounded. If possible, however, the cars used should be confined to the passenger-type cars.

*b.* Standard baggage cars may be used on an improvised ambulance train for transporting baggage and equipment of patients and duty personnel, as well as medical equipment and other supplies. A baggage car may be converted into a kitchen car.

*c.* The type of railroad cars available for improvising ambulance trains will vary so widely that no description can be attempted. However, every effort should be made to insure the maximum possible comfort to patients under existing circumstances.

## CHAPTER 8

### AIR EVACUATION

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#### Section I. INTRODUCTION

##### 104. General

Air evacuation is the transportation of the sick and wounded by aircraft. This method of moving casualties was proposed almost as soon as aircraft were used for military purposes, but it was not until World War II that wide use was made of this method of evacuation. The subsequent conflict in Korea further illustrated the military and logistic advantages of the aeromedical evacuation of casualties. Service responsibilities for performance of aeromedical evacuation are defined by assignment of functions as follows:

*a. United States Army.* Assigned function of aeromedical evacuation within the combat zone, to include battlefield pickup of casualties, their air transport to initial point of treatment and any subsequent move to hospital facilities within the combat zone.

*b. United States Air Force.* Assigned function of aeromedical evacuation for casualties from the initial point of treatment or point of subsequent hospitalization within the combat zone to points outside the combat zone; and in airborne operations, the evacuation of all casualties from the objective area until such time as ground linkup is attained. The troop carrier command normally evacuates casualties from the combat zone to the communications zone while the Military Air Transport Service evacuates casualties to the zone of interior and within the United States.

##### 105. Advantages of Air Evacuation

*a. General.* One of the most important advantages of air evacuation is the speed with which casualties can be moved over great distances in a comparatively short time. Speed is important when the rapid evacuation of casualties is indicated by the casualties' condition or by the military situation. Aeromedical evacuation will also reduce congestion on road and rail nets resulting from the rearward movement of casualties against the forward movement of troops and supplies.

*b. Evacuation in Difficult Terrain.* Casualties may be transported by air over natural or artificial surface barriers such as mountains,

snow and ice, or damaged roads or railroads where evacuation by other means would be difficult, if not impossible.

*c. Comfort and Safety of Casualties.* As compared to other means of evacuation, air transportation has proved to be more comfortable for casualties chiefly because of the short time they are in transit. Provided that air superiority is maintained, experience has proven air evacuation to be a safe and effective method.

*d. Morale.* The morale of an entire fighting force may be markedly elevated by the knowledge that casualties can be moved to medical facilities within a matter of hours rather than days.

*e. Treatment Enroute.* Large transport aircraft utilized for aero-medical evacuation are staffed with qualified Medical Service personnel who are trained and equipped to administer medical treatment measures while in flight, such as the readjustment of splints, the control of hemorrhage, the treatment of shock, and the administration of medications, oxygen, plasma, or whole blood. Pilots of Medical Helicopter Ambulance Detachments are Medical Service personnel also trained in administering emergency medical treatment measures.

## **106. Disadvantages of Air Evacuation**

*a. Over-Evacuation.* The ability of modern aircraft to evacuate casualties a great distance in a short time may tend to result in over-evacuation. Extreme care must be taken in the selection of casualties for air evacuation in order to avoid evacuating casualties whose condition will permit recovery in forward areas. By careful screening and selection of casualties for air evacuation, experienced personnel from combat units will be retained and returned to duty thereby reducing the number of replacements which are required to be brought into the combat zone and the theater.

### *b. Weather and Enemy Action.*

- (1) Transport aircraft are not as subject to weather conditions as are tactical aircraft. Weather has a limiting effect on all types of air movement, however, flights can be made during instrument or marginal weather conditions to any base that has flight control and landing aids.
- (2) In addition, air movements by transport type aircraft are subject to enemy action. Maintenance of air superiority is a prerequisite to extensive daylight operation of transport type fixed-wing aircraft.

## **107. Areas of Employment**

*a. Theater of Operations.* Two phases of air evacuation normally exist within the theater of operations.

- (1) *Within the combat zone.* Aircraft will be used for aerial evacuation as far forward as the tactical situation will per-

mit. Army aircraft will normally evacuate from battalion aid stations and collecting stations to Army medical units in rear of a division such as the mobile Army surgical or evacuation hospital. Army aircraft available for aeromedical evacuation includes aircraft assigned to Medical Helicopter Evacuation Detachments, Transportation Helicopter Companies and aircraft organic to other units of the field Army. In planning the location of division medical installations, consideration should be given to locating them whenever possible near landing fields for Army aircraft or cleared areas sufficiently large for helicopter landings. From these fields or landing areas casualties may be evacuated to designated field army installations. In airborne operations assault aircraft are employed to evacuate casualties from airheads to appropriate medical facilities in more rearward areas, thereby relieving the airborne forces of their noneffectives within the airhead area.

- (2) *From combat to communications zone.* At landing fields in the field army area, casualties may be collected from field army hospitals for air evacuation farther to the rear. Transport type aircraft evacuate these casualties to fields close by hospitals within communications zone.

*b. Zone of Interior*

- (1) *Theater of operations.* From the theater of operations, evacuation of patients to the zone of interior is accomplished by large transport aircraft of the Military Air Transport Service (MATS). Such transport type aircraft proceed to centrally located fields in the zone of interior and discharge their casualties for redistribution to appropriate zone of interior hospitals.
- (2) *Within the zone of interior.* Patients arriving in the zone of interior by airplane or other means of transport may be distributed by MATS or surface means to various hospitals within the zone of interior. Zone of interior patients also may be transported by aircraft between appropriate military medical facilities.

## **Section II. PREPARATION OF CASUALTIES FOR AEROMEDICAL EVACUATION**

### **108. General**

Careful screening of all patients by a flight surgeon, or in his absence by another medical officer, is accomplished in order to determine the advisability of transportation by air. Normally any patient who can tolerate a trip by other means of transport can be air



transported. However certain special cases must be flown at low altitude and under calm weather conditions.

### **109. Preparation of the Patient**

a. Preparation of casualties for evacuation by Army aircraft or helicopter is comparable to preparation of casualties for evacuation by motor ambulance. Preparation of casualties for evacuation by long range transport type aircraft requires more planning and preparation as the trip may last several hours to several days. Patients being air evacuated from medical facilities in the combat zone or from communications zone hospitals may either be transported directly from the hospital to the aircraft or from the hospital to a medical holding unit located near an airfield. In either case the following procedures will be accomplished prior to emplaning the patients.

- (1) Medical personnel aboard the aircraft will be advised regarding diet or special treatment required by patients, and in addition will be supplied with any special equipment, medication, or supplies required for treatment in flight.
- (2) Necessary clinical records and X-rays will be assembled and properly labeled and will accompany the patient on the aircraft.
- (3) Each patient's baggage, not to exceed the allowable weight limitations, will be assembled and tagged. Small parcels will be packed with cargo luggage not carried as hand-baggage. Baggage in excess of allowed limitations will be packed and shipped by surface means in accordance with existing policies.
- (4) Valuables of the patients whose mental or physical condition renders them incapable of properly safeguarding their property will be listed separately and delivered to the flight nurse or senior medical attendant on board the aircraft who will sign a receipt for such items.
- (5) Class IA and Class IB patients (par. 112), will be restrained with standard type restraints and be adequately sedated prior to flight.
- (6) A patient identity tag will be prepared for each patient for use as an individual identification and movement record.

#### **b. *Special Considerations.***

- (1) Normally the originating hospital will make arrangements to furnish necessary guards to accompany prisoner patients to hospitals of final destination. Prior to departure all prisoner of war patients should be thoroughly oriented through interpreters, concerning the medical evacuation in order to avoid panic during the flight. Many of these individuals may never have flown in an aircraft before. When

prisoner of war patients have to be carried in the same plane with friendly-force patients, adequate segregation and other safeguards must be taken to prevent fear or trouble between the two groups.

- (2) All patients under observation for, or having a diagnosis of, active pulmonary tuberculosis must be transported on a litter, dressed in hospital clothing, and wearing a mask. Only inactive or arrested cases may be transported as ambulatory patients.

## 110. Criteria

The decision as to whether or not air transportation is to be employed is dependent upon the patient's condition and the conditions to be encountered on the flight. Consideration is given to the altitude to be flown, the medical facilities provided on the aircraft, and the nature of the treatment required in flight.

a. Patients not normally acceptable for aeromedical transportation are those—

- (1) In infectious stages of quarantinable diseases. (International quarantinable diseases are: yellow fever, cholera, smallpox, plague, murine typhus and other infectious diseases that may be listed by any one of the nations abiding by International Quarantine Laws.)
- (2) With permanent tie wires between the jaws.
- (3) In a moribund or semimoribund state. Successful evacuation of this type of patient is doubtful and should not be attempted unless lifesaving measures are available at the destination hospital which are not available at the point of origin.

b. Patients acceptable for evacuation but who should be given special consideration are those with—

- (1) Conditions involving cardiac failure.
- (2) Severe anemias.
- (3) Respiratory embarrassment regardless of its basic cause.
- (4) Conditions where quantities of gas are confined in body cavities or the intestines such as pneumothorax and ileus.

## 111. Classification of Patients

Prior to air evacuation the originating medical facility classifies all patients according to their mental and physical condition. This classification is accomplished by a medical corps officer and likewise can only be changed by a medical corps officer.

a. *Class I Mental Patients.* This is further subdivided into Class IA severe psychiatric, Class IB locked ward psychiatric, and Class IC open ward psychiatric.

- (1) Class IA (Severe Psychiatric) are locked ward psychiatric patients requiring the use of restraint apparatus. This class includes all disturbed psychiatric patients. Class IA require special watch aboard aircraft and at enroute stops. They are delivered to the aircraft in pajamas, under sedation, restrained, and on a litter.
- (2) Class IB (Locked Ward Psychiatric Patients) are locked ward psychiatric patients who normally do not require the use of restraints. This class requires special watch aboard aircraft and en route stops. Patients of this category are delivered to the aircraft in pajamas, under sedation, and on a litter.
- (3) Class IC (Open Ward Psychiatric) are patients who are cooperative and undisturbed. They require no watch other than that necessary for Class III patients. They are delivered to the aircraft ambulatory and fully clothed.

*b. Class II (Litter Patients other than Psychiatric).* Patients of this class are delivered to the aircraft in pajamas on a litter. Special medication is provided as indicated.

*c. Class III (Ambulatory Patient).* This class includes ambulatory patients other than psychiatric who require only minor attention enroute.

*d. Class IV (Troops Class).* These patients are ambulatory patients other than psychiatric who are physically able to travel unattended.

## **112. Care of Patients at Remain-Overnight (RON) Hospitals**

*a. General.* When aircraft are employed for the transportation of patients it is often necessary for the aircraft to land and remain at an air base overnight. At such times the patients will be disengaged and cared for in the nearest military medical facility until the resumption of the flight.

*b. Responsibility.* Commanding officers of hospitals or infirmaries at RON stations assume complete responsibility for the patients, their valuables, baggage, and records during the period of their stay in the facility.

*c. Record of Medication and Treatment.* Medication and treatment administered enroute or at RON stops is recorded on the patient identity tag which accompanies the patient. Extreme care must be exercised to insure that the time, place, and date of administering any medication, particularly for Class I and II patients, is properly recorded.

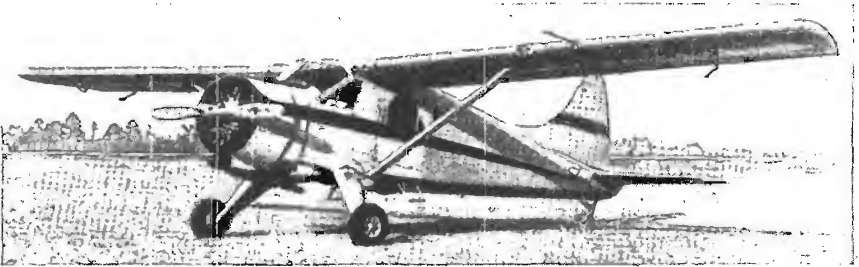
*d. Medical Screening and Preparation of Patient Departing From RON Stations.* The commanding officer of the RON facility will insure that a flight surgeon or other qualified medical officer checks

all patients for the purpose of establishing their fitness to continue travel by air to their destination prior to their departure from the facility. He will render necessary medical care and issue appropriate instructions when indicated relative to medication and treatment required by the patients prior to and subsequent to the resumption of air travel.

### **Section III. TYPES OF AIRCRAFT EMPLOYED IN AIR EVACUATION**

#### **113. General**

At the present time the Armed Forces have no aircraft specifically developed only for aeromedical evacuation. Many types of aircraft are currently being used for this purpose. These types range from



*Figure 176. L-20 light aircraft.*

Army aircraft capable of carrying two litter patients to the heavy transport types that may accommodate 127 or more litter casualties. Nearly all transport type aircraft are equipped for standard litter support fittings which facilitate their rapid conversion to aeromedical evacuation means. Since the great majority of aircraft used for evacuation have as a primary mission the forward movement of personnel, supplies and equipment and the evacuation of casualties as a secondary mission, they are not protected by the provisions of the Geneva convention. Consequently they do not display red cross markings and are subject to enemy attack.

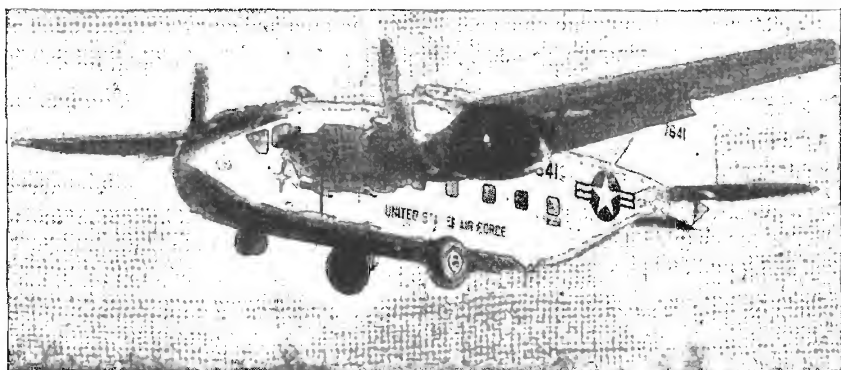
#### **114. Army Aircraft**

Army observation and utility airplanes organic to units of the field Army are capable by rapid modification of transporting litter casualties and medical attendants (fig. 176). This modification does not affect the primary function of the aircraft. Such airplanes can be employed in forward areas to evacuate from division medical installations. These missions are of an emergency nature and are secondary to the primary mission of the aircraft. Light transports such as the C-46, C-47, C-82, and C-122 and C-123 are equipped to transport from

18 to 34 litter casualties. The C-122 and C-123 are assault type transports and can land on unprepared moderately level ground. Their forward loads of personnel, ammunition, etc., can be unloaded and they can be reloaded with 10 to 24 litter patients in a matter of a short time. Aeromedical evacuation is a secondary mission of these aircraft (fig. 177).

### 115. Helicopters

Helicopters are used by all elements of the Armed Forces. They are standard equipment of the Helicopter Ambulance Units of the Army Medical Service, the Transportation Helicopter Company, as

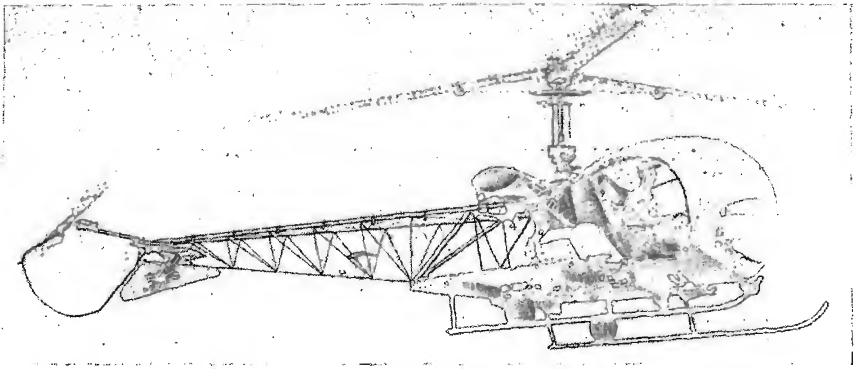


*Figure 177. Assault aircraft (C-123) taking off.*

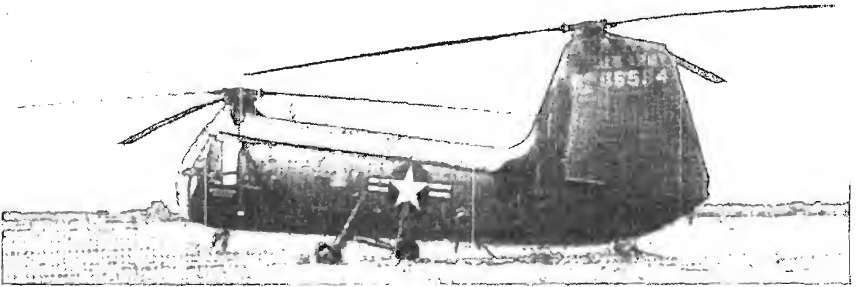
well as other units of the division, corps, and Army (1 and 2, fig. 178 and fig. 179). They are normally used to evacuate casualties from locations where inadequacy of landing areas, or other factors, make employment of conventional type aircraft infeasible. This type of aircraft can ascend and descend nearly vertically needing only a small clearing to land. The ability of the helicopter to circumvent fixed defenses and natural obstacles, to remove casualties from and transport medical supplies to otherwise inaccessible areas, and to transport casualties to predesignated medical installations increases the efficiency of the Army Medical Service. All suitable types may be equipped to transport litter casualties either in standard litter capsules attached outboard or on litter supports within the fuselage.

#### *a. Capabilities and Limitations.*

- (1) Current helicopter production models powered by reciprocating engines, which drive the rotors through intricate systems of transmissions, clutches, and controls are very heavy, and much of the power is lost in the gearing required. This characteristic becomes even more critical at high altitudes above sea level and on hot humid days when the aircraft will



① H-13 with casualty evacuation pods.



② H-25.

*Figure 178. Helicopter ambulance of the Army Medical Service.*



*Figure 179. The H-19 ten place cargo type helicopter of the transportation helicopter unit.*

not perform with its usual power. Helicopters are sometimes forced to move forward during takeoff in order to build up the required lift of the rotors, especially if the load approaches maximum.

- (2) Under normal atmospheric conditions and at altitudes less than 3,000 feet above sea level, helicopters are able to carry loads of cargo or passengers (in addition to the pilot and fuel necessary) for a radius of action of 50 to 70 miles approximately as follows:

Light Cargo	
H-19-----	1,000 lbs
H-21-----	3,250 lbs
Utility	
H-13-----	500 lbs
H-23-----	500 lbs

- (3) Helicopters takeoff and land in less space when there is a wind. Like fixed wing aircraft, they must land into the wind in order to effect a safe landing and take advantage of the velocity of the wind which provides increased lift.
- (4) The term "hovering" is applied to the maneuver performed by a helicopter wherein the aircraft maintains a fixed position in space over a designated spot on the ground. Under a "no-wind" condition all available power may be required to execute this maneuver especially if the aircraft gross weight approaches or exceeds the normal. This power requirement is increased in direct proportion to the altitude above sea level until a condition exists where the available power is no longer sufficient to produce the required lift to maintain altitude. The aircraft then settles very rapidly and cannot be controlled without the excessive loss of altitude—a dangerous condition. When a wind exists the problem of hovering is lessened but still must be considered. A pilot should never be required to make a landing where he would be required to hover or fly at a speed less than that required to provide translation lift at heights from 10 to 500 feet above the ground, especially at altitudes of over 3,000 feet above sea level under a no-wind condition.

*b. Selection of Landing Sites.* Although the helicopter may appear to perform miracles of flight, the aircraft does have its limitations and precautions must be taken to insure that landing fields are selected which will recognize these performance limitations. Landing sites in open flat terrain, free of trees and large bushes, present no particular landing or takeoff problems. Water or swamp land, of course, requires helicopters with flotation gear. All sites should be chosen

with a view toward concealment from enemy action. Sites in forests or mountainous areas should be chosen with a view toward size, condition of terrain, approaches, and the altitude above sea level. The landing site should be chosen with the following items as prime considerations:

- (1) *Concealment.* Insofar as possible the site should be chosen so that the approach of the aircraft as well as the site itself are hidden from enemy surveillance. It should also be in such position that it can be easily protected from encirclement or infiltration by the enemy. Dusty sites should be avoided whenever possible as the dust stirred up will reveal helicopter action as well as cause wear on aircraft parts. Panels marking the sites should be displayed only a minimum length of time, prior to the expected arrival of the helicopter and should be taken in immediately after their purpose has been accomplished.
- (2) *Size.* Since it cannot be assumed that sites will be used by small aircraft only, they should be prepared so as to accommodate the larger types. Therefore the size of the landing site should be at least 100 feet in diameter in order to allow ample room for the rotors of an aircraft up to the size of the H-21 to maneuver for a landing and takeoff. Sites completely surrounded by tall trees or steep hills will probably be in a dead air space area with resultant poor landing and takeoff characteristics and in the event of high winds would present in all likelihood great turbulence. Under such conditions the pilot is faced with great difficulties to the extent that the aircraft might be badly damaged or destroyed in the landing or takeoff. Such sites should obviously be avoided. The pilot must be the final authority as to whether a site is suitable or not.
- (3) *Approaches and exits.* The approaches to and exits from the landing site should be as large or larger than the diameter of the site itself and aligned into the prevailing wind with no obstructions which would require the aircraft to swerve in its course or which might become entangled in the rotors or landing gear.
- (4) *Condition of terrain.* The terrain where the landing gear of the helicopter will touch down should be as clear as possible of boulders, small trees, and holes and should be leveled to prevent tilting of the blades during takeoffs and landings. The terrain should be clear for a distance of about 100 feet to insure plenty of room for landing, moving, and taking off.
- (5) *Altitude.* The site should be at the lowest elevation prac-



licable so that additional weight may be carried and better control of the helicopter can be maintained.

*c. Preparation of the Landing Site.* The extent of preparations necessary to provide a landing site for helicopters is dependent on the use to which it will be put. For periodic or infrequent landings, elaborate preparations need not be made but only those which will insure safe operations. In an emergency, helicopter landings may be attempted under climatic and terrain conditions which normally would prohibit such landings. In such cases a common sense application of the following principles will assist in providing suitable sites:

- (1) If the site chosen has large boulders, bushes, or holes in the landing area, they should be cleared away or filled in for a distance of about 100 feet to prevent wrecking the helicopter, which might lurch upon contact with an obstruction which in turn may cause the main rotor to sever the tailboom, resulting in loss of control of the aircraft. This could cause the rotors or tailboom to strike the ground or some other obstruction. In the event there is no level unwooded area within practical distance of the area where a helicopter landing is required, the side of a hill even though heavily wooded may be utilized. By felling enough trees to provide the required clearing for the site, wedging them among the stumps on the lower side of the slope, by digging out the earth on the upper side, and by filling in around the felled trees on the lower side, the area is sufficiently leveled to accommodate the helicopter (fig. 180). Care should be taken to insure that the filled in portion is solid enough to support the weight of the helicopter which may have a gross weight of 6 tons or about that of a 4-ton, 6 x 6, cargo truck. A more ideal spot for such an operation would be in a draw extending down the side of a hill where it would be simpler to fill in and more solid upon completion. This also affords better cover. The last 50 yards of the final straight-in approach should be cleared of all obstructions such as jagged tree branches projecting higher than the surrounding trees. All wires which are strung between trees or across valleys in the vicinity should be cut down if not in use or usable. If the wires are in use or may be used in the future they must be marked clearly with strips of cloth, of a highly contrasting color, hung across the wires at intervals so as to make them clearly noticeable to the pilot during takeoff and landing. For security reasons the site should not be cleared or filled to an extent which would plainly reveal it to the enemy, nor should the ground be dug up unnecessarily so that a dust hazard is created.

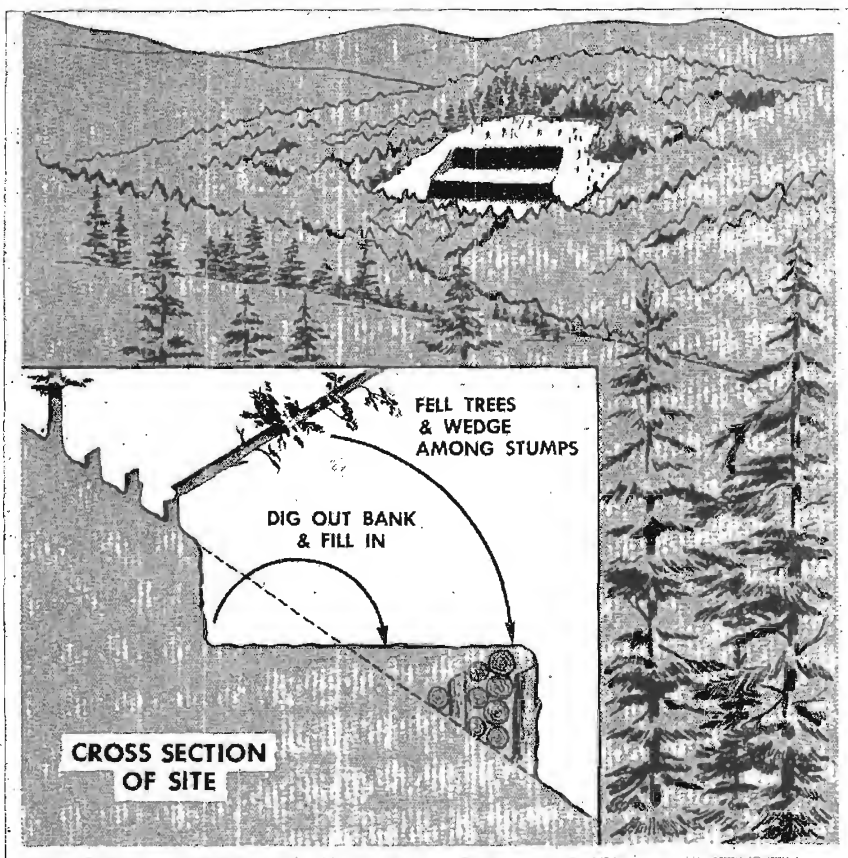
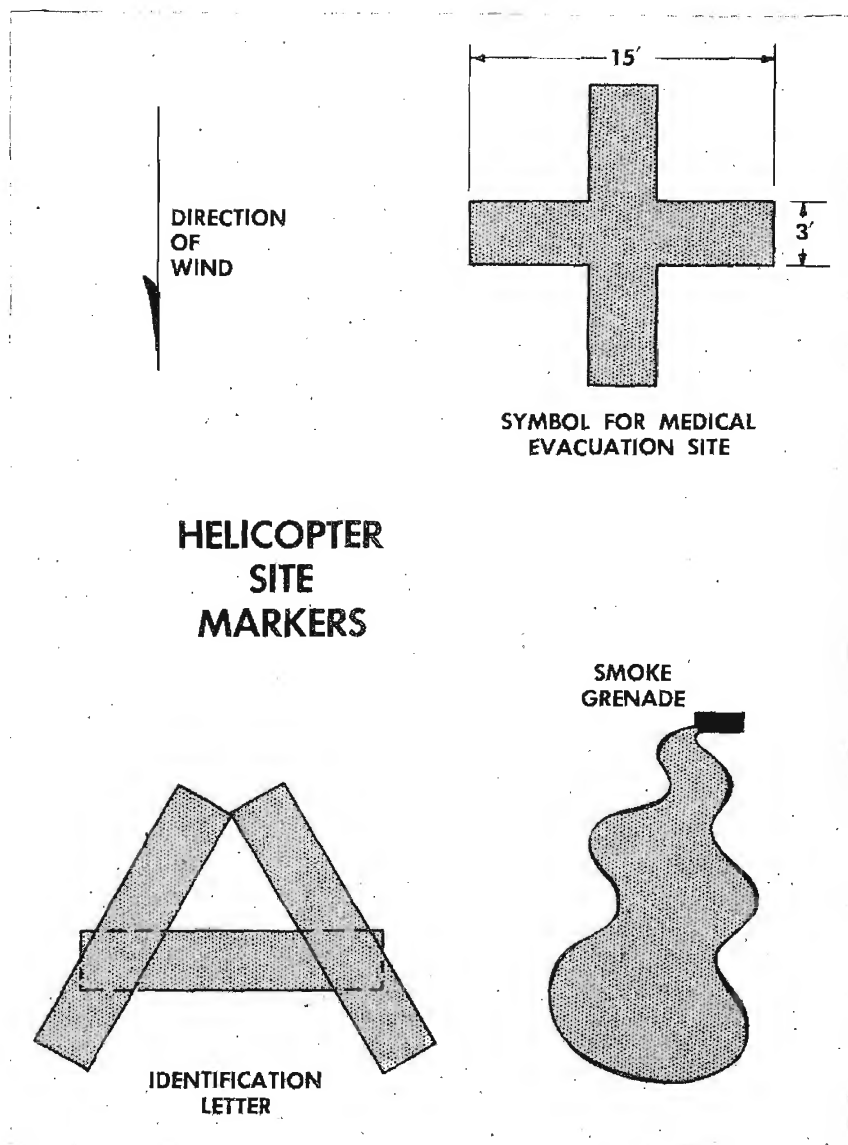


Figure 180. Helicopter landing site on side of hill.

- (2) *Camouflage.* If the site cannot be entirely hidden, it should be camouflaged as well as possible and changed frequently to preserve its security. Although the aircraft should depart the area as soon as possible, if it is forced to remain on the ground long enough to warrant stopping of the rotors, it should be concealed. To prevent damage to the aircraft, concealing agents should be carefully removed before the rotors are started.

d. *Marking the Landing Site* (fig. 181). In order that helicopter landing sites used for medical evacuation will not be confused with other helicopter landing sites, or fixed wing drop zones and landing fields, they are marked by a cross made by crossing two signal panels. Conditions which require missions to several units within a relatively small area raises the problem of identification so that helicopters destined for Unit "A" do not end up at Unit "B" or "C." For this reason landing sites must be appropriately identified. Indications as to the



*Figure 181. Helicopter site markers.*

direction of the wind are very important and should be made visible either by colored smoke or a strip of cloth attached to the end of a long stick and erected or held high in the air. For security reasons it is unwise to display any of these markings longer than absolutely essential prior to the expected time of arrival of the aircraft, and they should be gathered in immediately after their usefulness has ended.

They should never be abandoned at the landing site as they might tend to confuse future missions and bring attention to the area.

- (1) *Identification.* An identification letter in addition to the cross marker symbol should be agreed upon at the time the mission request is made and should not be changed before the mission is accomplished. If letters are used, the letters B, D, M, O, W, or Q should not be used, as these letters are either difficult to form or are too easily confused at a distance. The size of the symbol or letter should be small, yet large enough to be read from a distance of about 1,000 feet. It should be placed so as to face in the direction of approach.
- (2) *Wind indicator.* The direction and velocity of the wind may be indicated by colored smoke grenades or by fastening a cloth on a long stick and holding it overhead. This will also indicate any slight variations of the wind. Smoke should be so placed that it will not drift across or obscure the landing site from the pilot during his approach. The color of this smoke and the color of the panels are usually designated as additional items of identification in conjunction with the specified panel code letter. Colored smoke should be specified as the prevalence of white, gray, and black smokes in a combat area could otherwise be very confusing to the pilots.

*e. Operation of the Landing Site*

- (1) *Request for helicopter evacuation.* In addition to clinical data which may be required by higher authority, normally prescribed in SOP's, requests for helicopter evacuation should include the following:
  - (a) Location of the site, usually by map coordinates.
  - (b) Weather conditions.
  - (c) Color of panels and of smoke.
  - (d) Freedom from enemy activity in the area.
  - (e) Number of patients, diagnosis, conditions, and nationality.Requests should be complete in all details to avoid delay caused by requests for more information. Confirmation for the request will include the estimated time of arrival of the helicopter and any additional details not previously covered.
- (2) Upon anticipating the evacuation of casualties by helicopter, the unit commander should assure himself that a contact man who is familiar with the principles of helicopter operations is designated to conduct the operation at the landing site and that sufficient personnel are provided him to prepare the site, load or unload the aircraft, and make the site secure after the operation is concluded.



Figure 182. Helicopter landing site.

- (3) *Duties of the contact man.* The contact man has the following duties:
  - (a) Select and prepare the landing site.
  - (b) Brief his crew on safety provisions.
  - (c) Contact the pilot personally and sign for any supplies delivered.
  - (d) Direct the loading and unloading of the aircraft according to the instructions of the pilot.
  - (e) Brief the pilot on the position of enemy troops, direct him to other units in the area if he should inquire and make every effort to speed the helicopter on its way.
  - (f) Prepare a report stating the type of supplies which were delivered, quantity, to what point they were delivered, the casualties evacuated, and that it was accomplished by helicopter.
- (4) *Landing aid.* To aid the pilot in landing, one person should stand about 70 to 100 feet directly upwind from the spot where the helicopter is expected to land. Keeping his back to the wind, he holds the pole with the improvised wind indicator thereon overhead, or in the absence of the pole and streamer, holds his arms over his head in the shape of a V. This man provides a perspective for the pilot so that he may more accurately judge his landing. The man should wave the pilot around or over any obstructions that may not have been noticed during the descent (fig. 182).
- (5) *Weight and balance.* Current helicopters have no method of trimming for level flight which results in an unsafe condi-

tion if the aircraft is improperly loaded. Therefore, in loading the aircraft, care must be exercised to follow exactly the instructions of the pilot to insure that it will fly level. During evacuation of wounded, excess equipment should be eliminated to save space and weight.

- (6) *Safety precautions.* The tail rotor is the most dangerous part of the aircraft and personnel should be kept at a safe distance therefrom. Turning at high speed, it is practically invisible and not easily heard because of the flapping of the main rotors and the whine of the engine. Personnel prone to forget its existence may walk into it resulting in serious injury to themselves and damage to the aircraft. The main rotors are also a source of danger especially when slowing or starting as they may be deflected by a gust of wind from their normal arc striking someone underneath. Care should be taken in loading and unloading to avoid these sources of danger. Standing orders should forbid all personnel not directly concerned to keep clear of the area. If possible one man must be stationed at a safe distance to the rear of the helicopter where he can continually observe the track of the tail and main rotor blades and warn individuals if it appears they may approach too close to either. In the air all personnel should be cautioned against crowding to the front, to the rear, or around the open doorway. Such crowding will tend to unbalance the aircraft and make it difficult for the pilot to control especially upon landing or upon take-off. While in the air all passengers should remain seated.

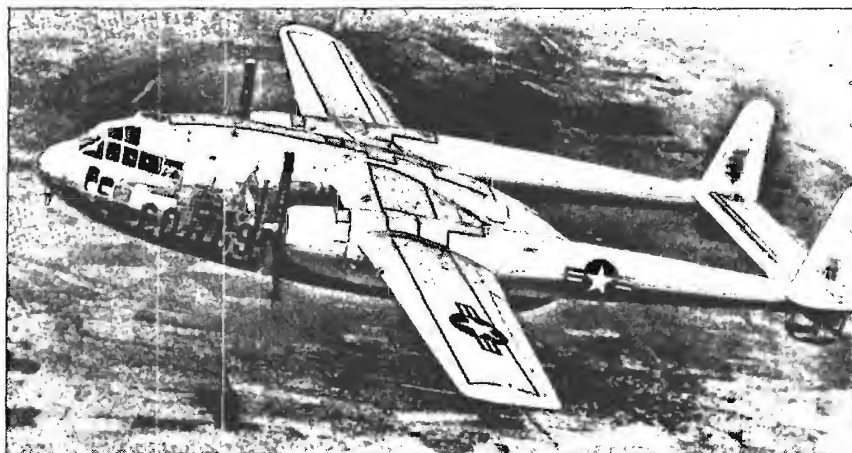
*f. Check List.* The following list contains the more important items which must be considered in selecting, preparing, concealing, marking, and operating a helicopter landing site. Check them off as the site is prepared to make sure the preparations are complete:

- (1) Is all pertinent information properly assembled for the request of a helicopter mission?
- (2) Are the terrain features such that the operation of the helicopter will be practical and safe?
- (3) Are the approaches to and exits from the site of satisfactory width and length and are they free of obstructions?
- (4) Is the site itself 150 feet in diameter and cleared satisfactorily?
- (5) Is the site sufficiently concealed or camouflaged and have enemy capabilities been properly evaluated?
- (6) Are the correct identification symbol and wind indicators available for display in advance of the arrival of the helicopter and are they of the proper color in accordance with information included in the request?

- (7) Is the contact man properly briefed for aiding the pilot in landing, unloading, and loading the helicopter and briefing the pilot on enemy capabilities and location of friendly troops?
- (8) Have all personnel been properly briefed on safety precautions?
- (9) Have personnel been designated to clear the site of panels and any other characteristics which, upon conclusion of the operation, might identify it as a helicopter landing site to the enemy?

*g. Selection and Marking of Landing Sites at Night.* In general all factors applicable to selection, marking, and operation of landing sites mentioned in previous paragraphs for operations during daylight are equally applicable at night. In addition the following factors govern night operations:

- (1) Operation should not be attempted at night unless the pilots are already familiar with the landing sites to be used through operations into and out of the area or unless they have been permitted ample time to make an aerial reconnaissance of the site and the routes to and from them during daylight.
- (2) For a landing site to be used at night there must be no obstructions in the vicinity which are higher than the surrounding trees nor any obstructions which would be invisible to the pilot such as wires, or poles. Though these can be marked during daylight so as to be visible, marking them at night is impractical and therefore they must be removed before the site can be used. This must be done even though the pilots may have become familiar with the location of obstructions through daylight operations at the site. If the alternative of changing the landing site is selected in preference to removal of the obstructions of this type, ample time for a daylight ground and aerial reconnaissance of the new location must be allowed before attempting the night operation.
- (3) The landing site is marked at night with four lights placed at the corners of the usable landing area. These should be colored lights if possible in order to distinguish them from other lights which may appear in the vicinity. The color in this case also constitutes one element in identification of the site. Flare pots or other types of open lights should not be used as they are usually blown out by the rotor downwash and often create a glare and reflection on the aircraft windshields which tend to blind the pilots. The site is further identified and distinguished from others operating in the general vicinity by a coded signal flashed to the pilot



*Figure 183. C-119 transport in flight.*

by a ground operator utilizing the directed beam of a signal lamp flashlight or other means. This signal is agreed upon at the time the request for the mission is made. The coded signal is flashed to the pilot continuously until recognition is reasonably assured. The signal operator who has taken his position on the up wind side of the landing site, then directs the beam of light down wind along the ground in the direction the wind is going so as to bisect the landing area. The pilot makes his approach for landing in line with the beam of light toward its source and lands at the center of the marked area. All lights are displayed for only a minimum time prior to arrival of the helicopter and are turned off immediately after the landing is accomplished. Usually the pilot will be able to accomplish his takeoff and departure without the assistance of lighting. During takeoff only those lights requested by the pilot are displayed. They are turned off immediately after his departure. Usually no navigational or landing lights will be displayed on the helicopter. The ground contact team must therefore listen for the helicopter and locate its exact position by the exhaust flame or its silhouette against the sky during its approach.

#### **116. Heavier Transport Planes**

a. A number of different types of medium transport aircraft are utilized by troop carrier units in transporting patients within theaters of operation. The C-119 is capable of carrying 35 litter or 65 ambulatory patients (fig. 183). The C-54 has approximately the same capacity. The C-124 heavy transport may also be used in normal troop carrier operations within the theater. This aircraft is becoming



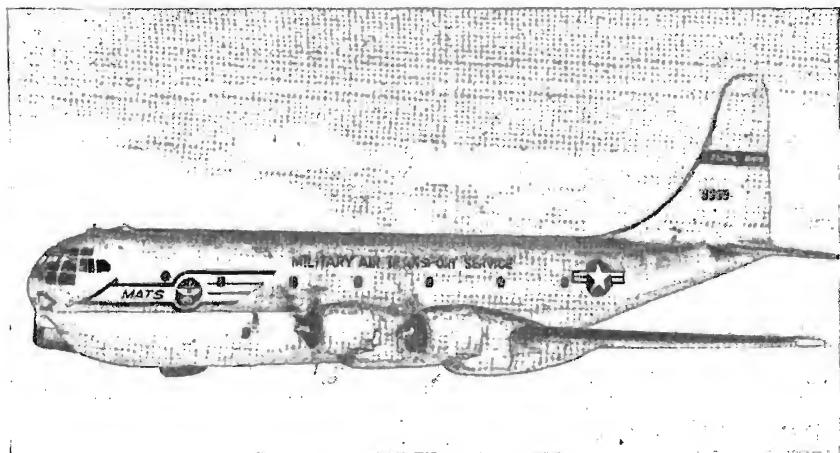


Figure 184. A Military Air Transport Service C-97.

available in greater numbers and eventually will become a part of all troop carrier operations. It carries a maximum of 127 litter or 200 ambulatory cases.

b. The Military Air Transport Service (MATS) is charged with the responsibility for aeromedical evacuation from theaters of operation to the zone of the interior. Heavier transports such as the C-74, C-97, and C-124 are currently being utilized in this mission. The C-97 has a capacity of 130 ambulatory or 79 litter patients, but normally airlifts only 110 ambulatory or 60 litter patients in order to provide maximum comfort to patients (fig. 184). The C-74 is capable of airlifting a total of 115 litter patients. Even larger planes are in the process of development and it is anticipated that their capacity potential will eventually be in excess of the aircraft now in use.

#### 117. U. S. Air Force Medical Units for Evacuation by Air

a. *Designation.* The Air Force medical unit organized for the purpose of caring for sick and wounded during air evacuation is the Aeromedical Evacuation Squadron. The number of such squadrons allocated to any given theater depends upon the requirements and the authorized troop basis. Normally these units operate with the troop carrier command. However, the decision as to their utilization is a responsibility of the theater air commander.

b. *Organization.* The aeromedical evacuation squadron is normally utilized in conjunction with heavier troop carrier or other transport units. It is organized to include a headquarters, an administrative section, an operations section, and a service section. Under the operations section there are four or more evacuation flights and three or more liaison flights. The evacuation flights provide medical care

and treatment to patients during flight in conventional type aircraft. Evacuation teams within the flight may consist of a nurse and one or two technicians or two or more medical technicians operating independently depending upon the size and the medical condition of the patient load. Liaison flights are located with the squadron at each major pickup point to facilitate communications, patient preparation, and liaison between originating agencies and troop carrier units. The service section assists in patient handling, provides medical supplies, food service, and transportation to the squadron, and furnishes service teams to perform these same functions for deployed evacuation flights and liaison flights when necessary. The service section is also responsible for property exchange with the Army and the Navy of all medical equipment and supplies peculiar to air evacuation operations. When a patient load requires his attendance a flight surgeon may be detached from a local Air Force medical facility for this purpose, returning to his organization upon completion of the flight.

*c. Aeromedical Evacuation Groups.* Aeromedical evacuation groups are established within the theater at major points of change in air evacuation and are normally located within the communications zone. The capacity of this group varies with the patient load and may range from 100 to a peak of 1,500. These units are established at airbases as may be directed by the theater air commander dependent upon the requirements of given areas.

#### **Section IV. LOADING CASUALTIES ABOARD AIRCRAFT**

##### **118. General**

*a.* Loading casualties aboard light aircraft ordinarily presents no special problems as the motor vehicle ambulance personnel that transported the casualties to the landing strip can accomplish the loading.

*b.* Prior to loading USAF aircraft with patients an inspection of the aircraft is conducted by the Senior Air Force Medical Service attendant. This inspection includes the following:

- (1) Inspection of litter straps, clamps, stanchions, hot cups, spare flashlights, and so forth; to insure that rigging is secure and that all equipment is in satisfactory operational order.
- (2) Check of equipment such as medical chests, water and coffee jugs, walk-around oxygen bottles, trash receivers and other movable items to see that they are properly lashed to withstand flying conditions and constitute no hazard to occupants of the aircraft.
- (3) Conducting a communication check with the pilot over telephone to insure that the cabin to cockpit communication system is operative.

- (4) The loading of patients survival equipment, and so forth, to insure conformity with the existing instructions for that particular aircraft.

*c.* Loading casualties aboard the larger transport aircraft requires prior planning depending upon the capacity of the aircrafts, the length of the flight, the number of litter and ambulatory casualties to be transported. It is the responsibility of the aircraft crew to prepare the aircraft to receive litter casualties but it is the responsibility of the commander originating the casualties to deliver them to the landing field and load them aboard aircraft. Actual loading of casualties is normally performed under the supervision of aeromedical evacuation squadron personnel.

*d.* In airhead operations casualties are normally transported by jeep or litter bearers to designated points within the perimeter of the airhead where assault aircraft are normally present. These points are identified by checkered flags. Here elements of the forward aeromedical evacuation flights take over supervision of the loading operations.

### **119. Loading Plan**

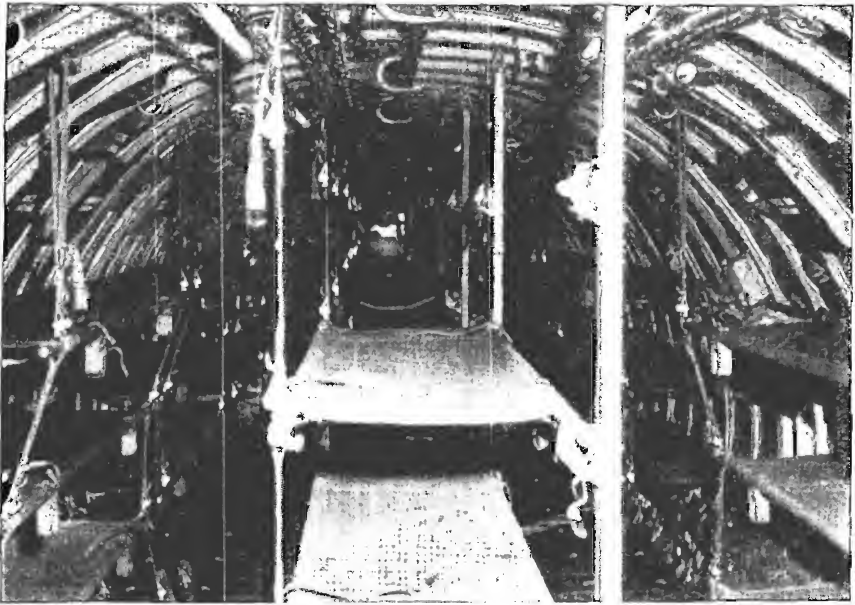
Normally the aeromedical evacuation squadron personnel is responsible for developing loading plans. Transport aircraft carry litters in tiers normally three litters high (fig. 185). In developing a loading plan the objective is to place each litter casualty in a position that will provide most comfort for him and still will not detract from the comfort of the other casualties. It is necessary to consider the diagnosis, any preflight preparation or medication to be given the casualty, point where he is to be unloaded, and the amount of care required in flight. Some general rules for loading casualties aboard aircraft are as follows:

*a.* On aircraft equipped with tricycle landing gear all patients should be loaded with feet toward the front of the aircraft. This position offers the greatest protection in the event of sudden deceleration. Deviation from this procedure may be effected only when medically indicated as determined by the Senior Air Force Medical attendant.

*b.* Casualties are loaded with their heads toward the front of the aircraft in such aircraft that land in the tail low position such as the L-20, C-47, and others.

*c.* So far as possible ambulatory patients are assigned to the top litters of all tiers first, and the remaining distribution in the aircraft is determined by the Senior Air Force Medical Service attendant.

*d.* The correct position in the aircraft for litter patients is determined by the patient's injury or illness. Those patients in plaster casts or splints must be placed on the correct side of the aircraft so that the injured limb can be accessible for treatment. Certain types



*Figure 185. Interior of C-97 showing arrangement of litters.*

of patients may be required, because of their condition, to travel in the sitting or semiprone position on a litter. In such cases the space for two litters must be utilized.

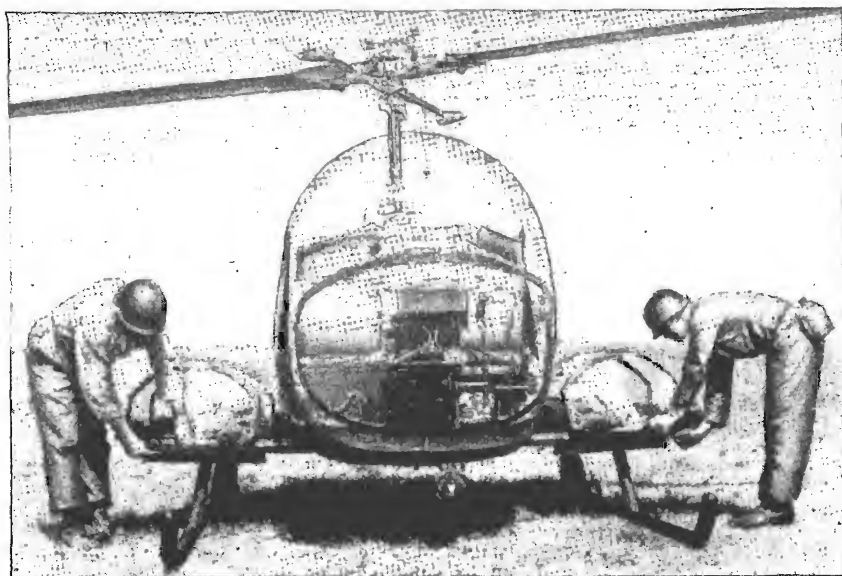
*e.* Female patients should be segregated as much as possible from male patients.

*f.* Patients requiring bedpans, transfusions, special treatment or dressings during flight, should be placed in the middle tier where they are more accessible for care.

*g.* Patients who are unable to help themselves should, if possible, be located near the main cargo door in order to facilitate their egress in event of an emergency.

*h.* Loading plans generally insure that patients suffering mental disturbances are located in positions that afford maximum observation; while those with a diagnosis of tuberculosis or other communicable disease should be loaded in forward litter tiers. Patients who are restless (such as head injury cases) or unconscious are placed in the bottom tier. Similarly patients with coughs or those subject to air sickness should be placed on the bottom tier positioned at the down wind end of the normal ventilation flow.

*i.* When all patients have been loaded their valuables and personal effects can be stored in the baggage compartment or the after-part of the cabin in the aircraft.



*Figure 186. Removing casualty protecting canopy securing pin.*

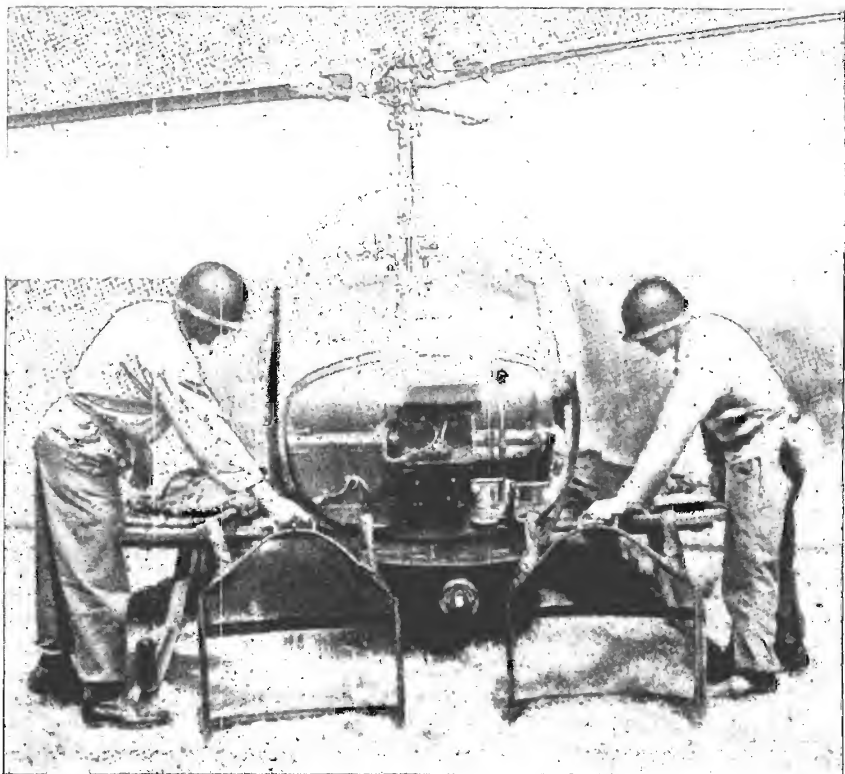
j. A preflight briefing should be given to all patients. It is the responsibility of the Senior Air Force Medical attendant to insure that it is conducted as flight routine prior to starting the engines before each flight. Briefing should be complete and conducted in such a way as not to alarm patients who are in many cases flying for the first time and who may exhibit a certain degree of apprehension.

## **120. Steps in Loading**

a. *Transport Aircraft.* A minimum of four men is required to load transport aircraft. Two men are required to remove litters from the ambulances and carry them to the aircraft. Two additional men in the plane receive the litter and carry it to its predetermined place within the aircraft. At least one of the men handling the litters inside the aircraft must be familiar with the method by which litters are secured. Litters are loaded in order from top downward and from the front to the back.

### *b. Helicopter*

- (1) *Preparing for loading.* To prepare the H-13 helicopter for loading, the first step is to remove the pin securing the casualty protecting canopy (fig. 186). The casualty protecting canopy is then removed and placed handle up in front of the helicopter (fig. 187). Next, the waterproof cover is



*Figure 187. Casualty protecting canopy removed.*

unzipped and folded out of the way (fig. 188). If property exchange, litters, blankets, and splints are aboard the helicopter, they are removed and carried well away from the helicopter, being careful that long objects such as litters are carried parallel to the ground to avoid the danger of striking the rotating rotor blades (figs. 189 and 190).

- (2) *Loading.* The helicopter is always approached from the front. If only one patient is to be evacuated, he is loaded on the right evacuation pod. If two patients are to be evacuated, the heavier patient should be loaded on the right. Depending on the number of litter bearers available, casualties may be loaded on helicopters by 2-, 3-, or 4-man teams. The litter is placed on the evacuation pod so that the casualty's head is to the front of the helicopter, and securely strapped onto the pod with the casualty securing strap (fig. 191). The waterproof cover is then spread over the casualty and zipped closed. The casualty protecting



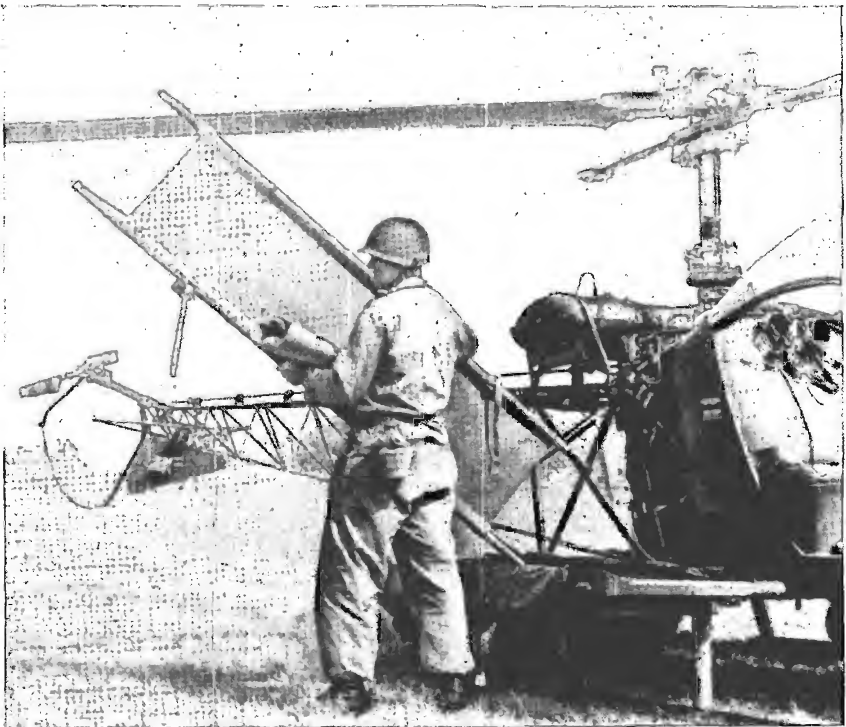
*Figure 188. Unzipping casualty protecting cover.*

canopy is then attached to the evacuation pod, making sure that the securing pin is properly engaged (fig. 192).

- (3) *Unloading.* To unload casualties from a helicopter, the casualty protecting canopy is removed by disengaging the securing pin and placed in front of the helicopter. The waterproof protective cover is then unzipped and folded out of the way. The casualty securing strap is then unbuckled and the casualty removed.

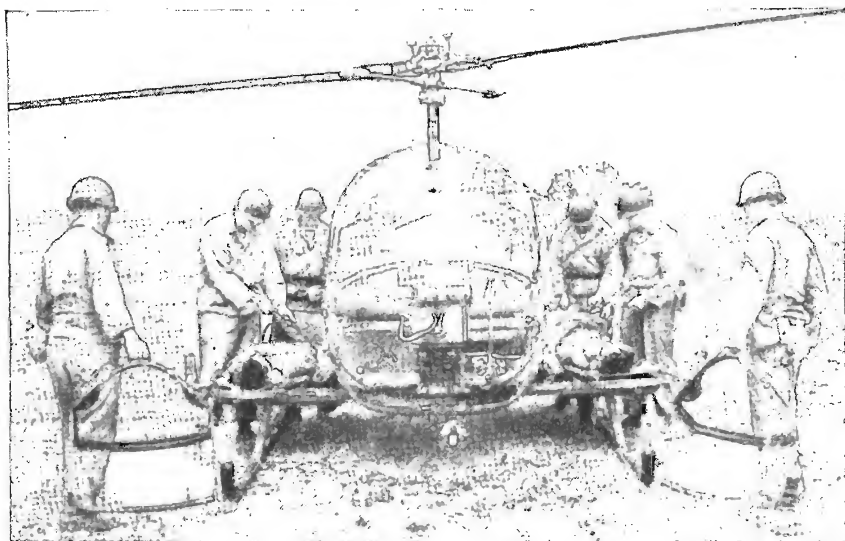


*Figure 189. Correct method of removing property exchange litters from helicopters.*



*Figure 190. Danger of damaging helicopter rotors by incorrect handling of equipment.*





*Figure 191. Securing casualty in casualty evacuation pod.*



*Figure 192. Attaching casualty protecting canopy.*

## CHAPTER 9

### WATER TRANSPORTATION

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#### 121. General

*a.* Evacuation of casualties of all the Armed Forces, when accomplished by ocean-going vessels, is a responsibility of the Department of the Navy. This includes transoceanic, intratheater, and coast-wise evacuation. The Navy becomes responsible for casualties when they are embarked on ships or small craft of the Navy. During an amphibious operation, evacuation of casualties may be accomplished by vessels of the fleet, such as attack-type transports; under other conditions it may be accomplished by vessels operated by the Military Sea Transport Service (MSTS). MSTS operates all hospital ships and all troop transports other than those assigned to the fleet. All naval vessels used for evacuation of casualties are staffed with naval medical personnel. Army or Air Force medical personnel may be assigned to these vessels to augment the naval medical staff.

*b.* Evacuation of casualties over water barriers such as rivers and lakes normally is a responsibility of the medical service of the Armed Force concerned.

#### 122. Water Transportation, When Employed

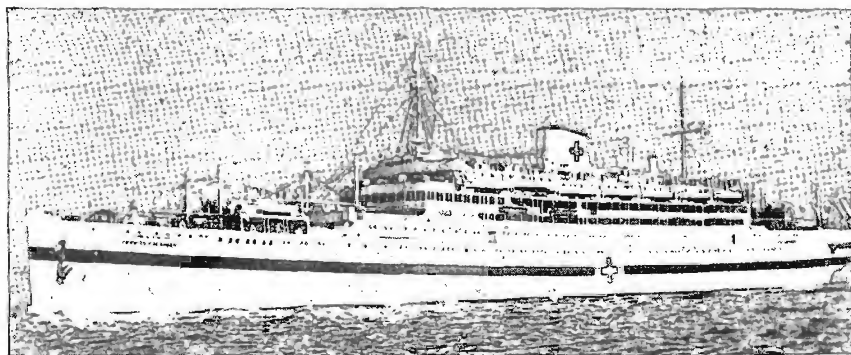
*a. Oversea Operations.* Evacuation of the sick and wounded by means of water transportation is necessary when a military force is operating in a theater separated from the zone of the interior by a large body of water. This means of evacuation is augmented by, or itself augments, air evacuation.

*b. Amphibious Operations.* Amphibious operations may initially require evacuation of casualties by small craft to ships of the amphibious force having sufficient assigned medical personnel to provide medical service.

*c. River Crossings.* In the event of a river crossing and the establishment of a bridgehead, evacuation of casualties by assault boat, raft, or cable will be necessary pending sufficient development of the situation to permit the construction and use of bridges.

*d. Aircraft Crashes.* Airplane crashes occurring over water demand rescue by small surface craft in the absence of suitable aircraft.

*e. Waterways Within a Theater of Operations.* When suitable craft are available, rivers, lakes, canals, or other bodies of water,



*Figure 193. Hospital ship.*

especially if they are perpendicular to the front, may become important links in the chain of evacuation.

### **123. Hospital Ships**

*a.* Hospital ships, designated by the Navy as AH (followed by a number), are major ships designed to operate either with the fleet or with the Military Sea Transport Service. They are constructed and employed so as to conform to the provisions of the Hague and Geneva Conventions, under which conventions they are immune from enemy attack. Characteristic construction and employment features are—

- (1) The exterior of the ship is painted white with a horizontal green stripe of one and one-half yards' width encircling the hull.
- (2) The Red Cross flag is flown.
- (3) Lights sufficient to disclose the character of the ship must be displayed at night.
- (4) The identity of the vessel will be announced to the enemy prior to its employment.
- (5) The ship's company will be composed of noncombatants.
- (6) It must not be employed for any military or unneutral purpose.

*b. Personnel and Facilities.* The hospital ship is manned as prescribed by the United States Navy. The number of assigned medical personnel is roughly equivalent to that of a 750-bed hospital, and includes medical and surgical specialists of most categories. It has all of the facilities of a well-equipped hospital, including wards, operating rooms, X-ray, clinical and pharmaceutical laboratories, and a dental section (fig. 193).

*c. Employment.* The hospital ship is employed so as to provide medical support to the fleet and to the amphibious forces to which it is attached. It provides definitive treatment for embarked casualties,

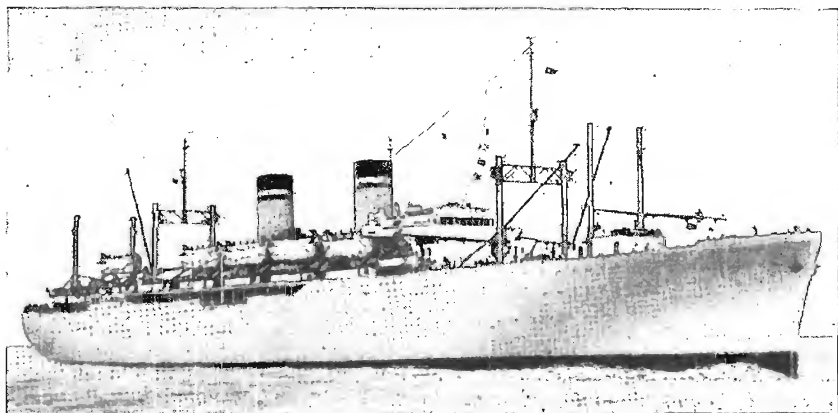


Figure 194. Transport ship.

and coincidentally may occasionally evacuate patients from the combat zone to the communications zone or to the zone of the interior. In addition to its own requirements sufficient medical stores are carried to provide resupply for the medical service of advance units and ships of the fleet.

#### 124. Transport Ships

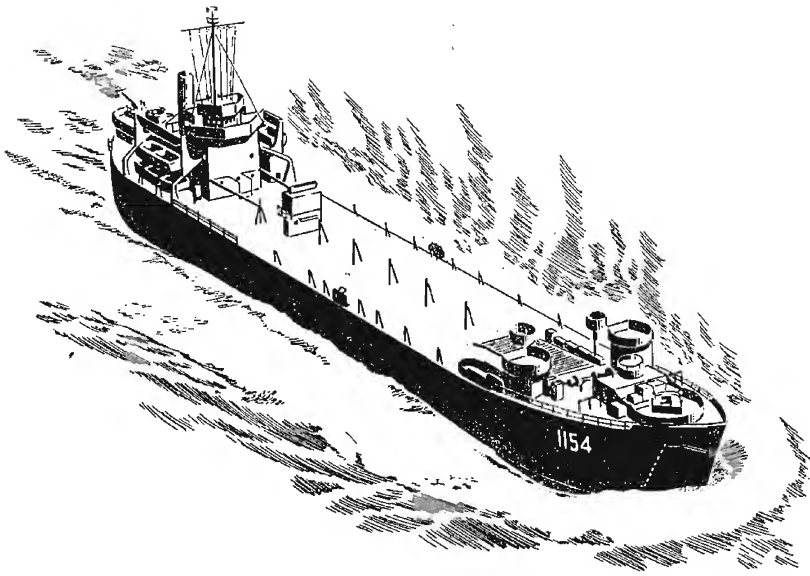
a. Transports, designated by the Navy as AP (followed by a number), or APA (followed by a number), although possessing no special hospital facilities other than those of any transport, are utilized for the reception and evacuation of casualties from a theater of operations. Because the primary use of such ships is military in nature they are not protected by the Hague and Geneva Conventions. The staffing of these ships with medical personnel is a naval responsibility; however, Army and Air Force medical personnel may be assigned to supplement the ship's normal medical complement (fig. 194).

b. Attack Transport Hospital, designated by the Navy as APH (followed by number), is a fast troop transport, heavily armed and possessing, in addition, special medical and surgical facilities for the care of embarked casualties. These ships, like the AP and APA are not protected by the Geneva and Hague Conventions.

#### 125. Landing Craft

a. *General.* Landing craft of the Navy may be divided according to size into two categories, large and small.

b. *Large Landing Craft.* Craft of this category used in transportation of the sick and injured are exemplified by the LST(H), or Landing Ship Tank. It is a ship designed for the landing of personnel and equipment through a bow door and ramp. Its primary



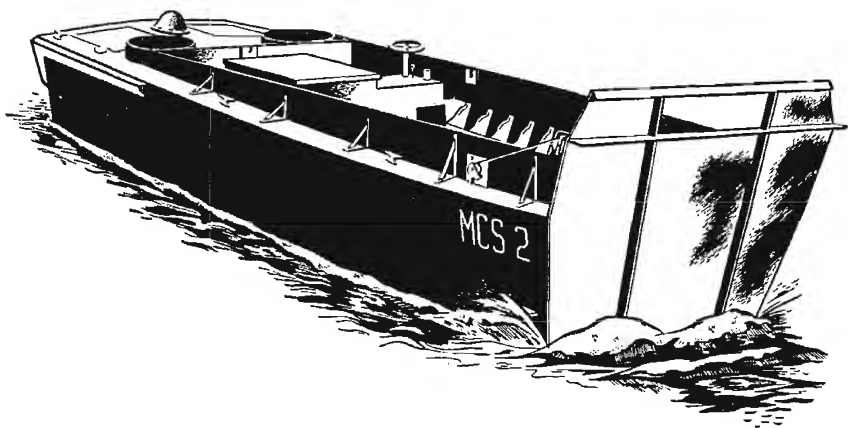
*Figure 195. Landing ship, tank.*

medical mission is the regulation of casualty flow from the beach to transports and hospital ships. In addition, by virtue of special medical personnel embarked, and special facilities it possesses, it is capable of retention of casualties aboard for medical and surgical care (fig. 195).

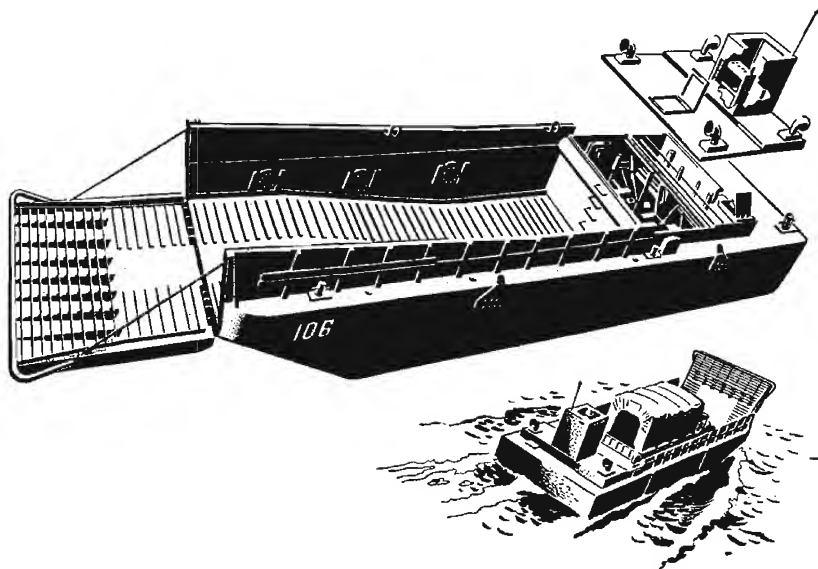
*c. Small Landing Craft.* The various types of these craft employed in the evacuation of the casualties from shore to ship include the LCVP (Landing Craft Vehicle, and Personnel), the LCM (Landing Craft Mechanized), and the LVT (Landing Vehicle Tracked). The Army DUKW (Amphibious Truck) and other amphibious vehicles may be utilized for the same purpose. The LCVP is perhaps the craft of choice in evacuation of casualties. Because litter space on the decks of these boats is limited, special racks have been devised to permit the tiering of litters. When reefs are encountered the DUKW or the LVT becomes the craft most desired (fig. 196).

## **126. Embarkation of Casualties**

*a. Offshore.* The embarkation of casualties may take place in a variety of situations. In the early phases of an amphibious operation docks or piers may be inaccessible or nonexistent, and embarkation must be accomplished when the recipient ship is anchored at some distance from the shore. In this situation the casualties are transported from the beach to the ship by small craft. Upon arrival



① Vehicle and Personnel (LCVP).



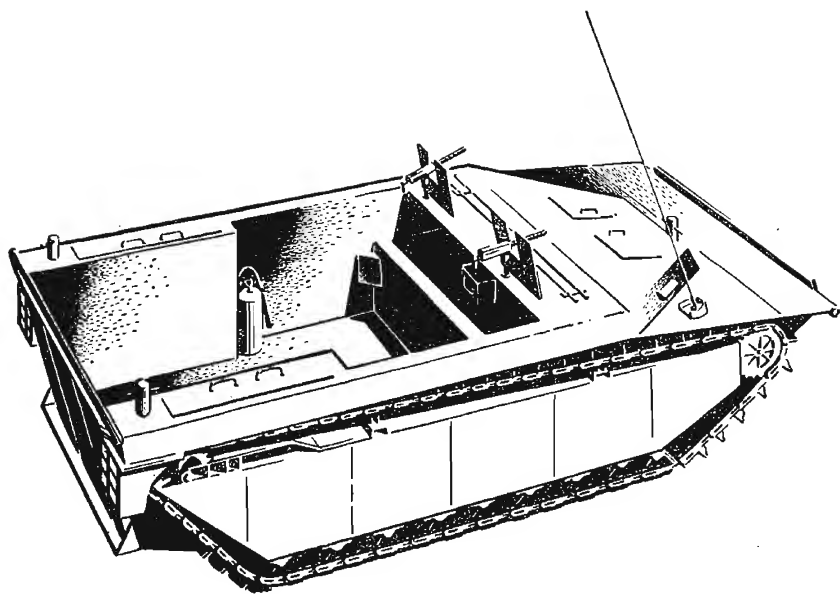
② Mechanized (LCM).

③ Tracked (LVT).

*Figure 196. Landing Craft.*

at the ship, a transport, hospital ship, or LST, they are embarked in the following ways:

- (1) Litter hoist—Manual or mechanical, singly or in multiples on prepared frames or platforms.
- (2) Ladder—Accommodation, Jacobs, or cargo net. This method is suitable only for fully ambulatory cases.
- (3) Hoisting of boat by davits to deck level.
- (4) Marriage of boat to bow ramp of LST.
- (5) Embarkation of DUKW or LVT on LST via the bow ramp.



④ Tracked (LVT).

Figure 196—Continued.

*b. At Ports.* If dock facilities are available the ship may be docked and casualties embarked over the gangway.

## 127. Crossing Rivers, Lakes, and Other Small Bodies of Water

*a. General.* It will often be necessary, especially in offensive operations, to devise some method of crossing rivers, lakes, and other small bodies of water that are barriers in the evacuation of casualties. In the early stages of attacks, pontoon and other bridges are generally used exclusively by forward-moving troops, so that rearward traffic must construct its own means of stream crossing.

*b. Assault Boats.* Engineer assault boats, when available, are readily adaptable to the needs of evacuation. Two litter casualties can be placed lengthwise in the bottom of the boat and four above them crosswise, with the litter handles resting on the gunwhales and the litter stirrups just inside the boat holding the litters in place. Room is thus allowed in the bow and stern for personnel to paddle the boat.

*c. Amphibious Trucks (DUKW's).* With minor modifications, the 2½-ton amphibian truck may be used for the evacuation of casualties across water obstacles (par. 97). In addition to the driver and assistant driver, twelve litter casualties and two attendants may be transported on this vehicle (figs. 170 and 171).

*d. Cables.* Two litter casualties can be transported across a stream by the cable and sling method. The cable of a 2½-ton winch truck is

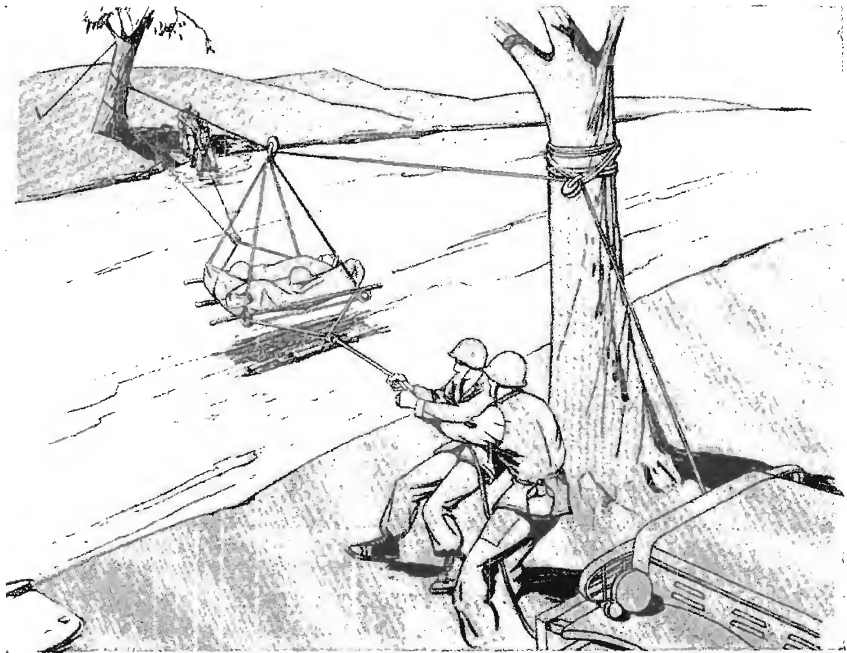
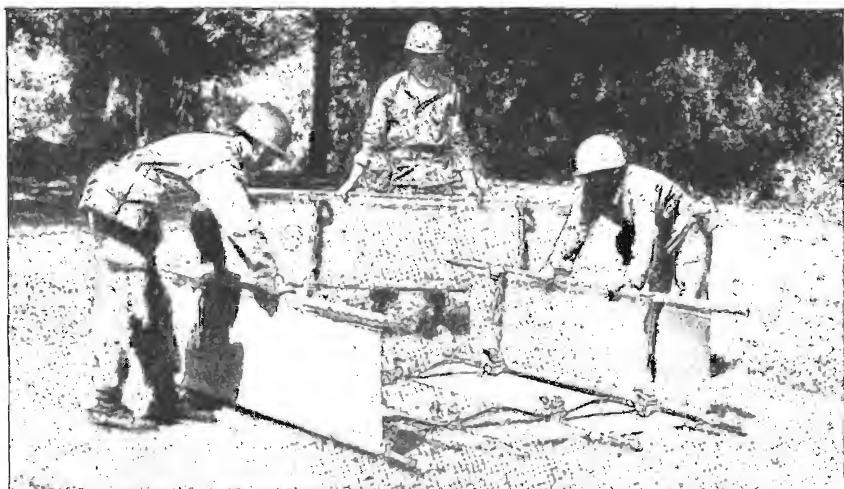


Figure 197. Cable and sling method using winch cable from 2½-ton truck.

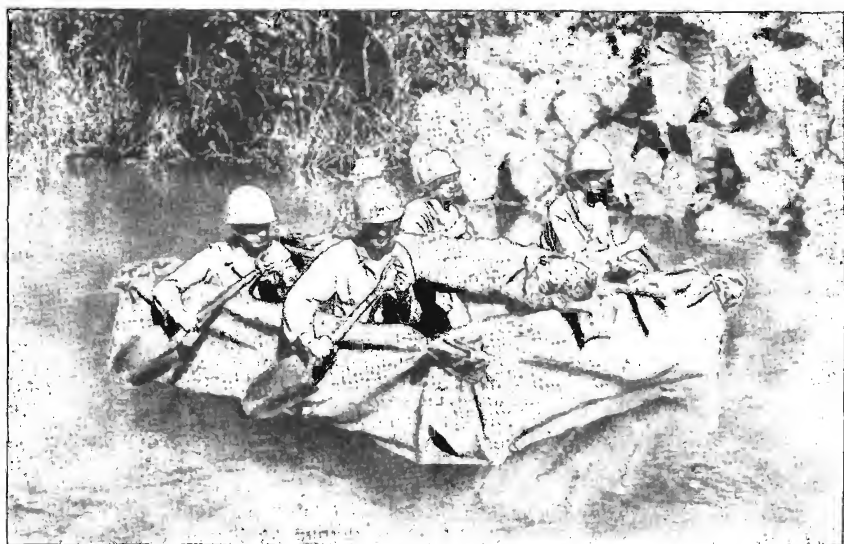
strung through a pulley which is then fastened to a tree. It is then carried across the stream and fastened to another tree or other holding device on the opposite shore. A second pulley runs free along the cable. Suspended from the second pulley by ropes are two saplings, poles, or other appropriate objects of the width of two litters. The litters rest upon these poles, with the litter stirrups just inside the poles and holding them in position. Personnel on the two shores control the crossing by the use of two ropes, the man on the near shore pulling the litters across and the man on the far shore maintaining control by holding them back, when necessary. When the litters have crossed, the casualties are removed, the device is pulled back to the other side, and two more casualties are sent across. The entire apparatus can be erected in less than one-half hour with the use of equipment readily available to medical troops. Once constructed, it permits an uninterrupted flow of litter casualties across the stream. Due to the limited length of the cable available, the use of this method is restricted to bodies of water less than 200 feet in width (fig. 197).

*e. Litter and Paulin Raft.* A raft may be constructed of seven litters and the paulin from a 2½-ton truck. The paulin is spread open upon the ground and three litters are laid, stirrups up, in its center. The other four litters are placed on their sides to form the





*Figure 198. Constructing litter and paulin raft.*



*Figure 199. Casualty being transported on litter and paulin raft.*

basis of the four walls of the raft, their handles interlocking and lashed together with lengths of rope. The sides of the paulin are then lifted and folded over the four litters and tied in place, thus completing the raft walls. This raft will accommodate two litter casualties plus escort; it is very stable and can be operated by paddling or by being pulled. Upon proper direction it can be constructed in 15 minutes even by untrained men (figs. 198 and 199).

## INDEX

	<i>Paragraph</i>	<i>Page</i>
Air evacuation:		
Advantage.....	105	156
Areas of employment.....	107	157
Disadvantage.....	106	157
Preparation of patients.....	109	159
Types of aircraft employed.....	113-116	162
Helicopter.....	115	163
Light fixed wing aircraft.....	114	162
Transport planes.....	116	174
Aircraft, light.....	114	162
Aircraft, transport type.....	116	174
Animal evacuation of casualties.....	75	103
Arms carry (one man).....	7	5
Arms carry (two man).....	16	21
Assault boats.....	127	189
Back lift and carry.....	13	17
Bus ambulance.....	87-92	112
Cable and sling method of stream crossing.....	172	189
Cacolet.....	75	103
Care of patients at remain-overnight-hospitals (RON).....	112	161
Casualty evacuation sleeping bag.....	77	105
Casualties, types.....	23, 112	29, 34, 160
Classification of patients for air transport.....	111	160
Converting military vehicles to casualty carriers.....	93-99	144
Armored personnel carriers.....	99	150
Cargo carrier, M29C.....	98	148
General.....	93	144
Truck, ¼-ton, 4 x 4.....	94	144
Trailer, ¼-ton.....	94	144
Truck, ¾-ton.....	95	146
Truck, 1½-ton.....	95	146
Truck, 2½-ton.....	96	147
Truck, amphibian, 2½-ton.....	97	147
Crossing river, lakes, and other small bodies of water.....	127	189
Dressing the litter:		
General.....	53	74
One blanket.....	54	74
Two blankets.....	55	75
Three blankets.....	56	75
Fireman's carry.....	5	4
Hand carry (four hands).....	18	24
Hand carry (two hands).....	19	24
Helicopter.....	115	163
Hospital ships.....	123	185

	<i>Paragraph</i>	<i>Page</i>
Improvised litters.....	67-72	95
Landing craft.....	125	186
Litter:		
Ambulance cot, Bomgardner.....	25	34
Definition.....	22	34
Folding aluminum litter.....	25	34
General.....	24	34
Mountain basket type litter.....	25	34
Semirigid canvas litter.....	25	34
Stokes metal litter.....	25	34
Straight aluminum litter.....	25	34
Litter and paulin raft.....	127	189
Litter bracket for ½-ton truck.....	87	112
Litter carrying aids.....	73-84	100
Litter drill:		
Bring litter squad into line.....	41	57
Carry litter.....	35	47
Change bearers.....	37	49
Close litters.....	39	55
Formations.....	29	41
Ground litter.....	36	49
Lift open litter, loaded or unloaded.....	43	59
Litter at shoulder.....	32	44
Litter, closed, strapped, and folded.....	28	40
Litter squad.....	27	40
Lower litter.....	44	59
March forward.....	45	60
Open litter.....	38	50
Order litter.....	33	45
Procurement of litter.....	30	42
Resume litter post.....	42	59
Return of litter.....	31	43
Shoulder, litter.....	34	45
Strap, litter.....	40	56
Litter, drill, loading and unloading casualties:		
General.....	46	60
Load and unload litter (four men).....	48	61
Load and unload litter (three men).....	49	64
Load and unload litter (two men).....	50	66
Load and unload litter with a casualty with back injury.....	51	72
Litter evacuation in mountain operation:		
Ascending slopes.....	81	108
Cliffs.....	83	109
Descending slopes.....	82	109
General.....	78	107
Lashing litters.....	79	108
Modified travois.....	80	108
Monocable, casualty evacuation.....	84	110
Litter evacuation in snow and extreme cold.....	76-77	105
Litters, improvised:		
Blanket litter.....	72	99
Door or board litter.....	70	96
Pole and jacket litter.....	69	96

Litters, improved—Continued		
Pole and blanket litter.....	68	95
Pole and litter.....	71	98
Litter, obstacles:		
Carry loaded litter upstairs and downstairs.....	62	81
Culverts, tunnels, and large pipes.....	65	94
Litter obstacle course.....	58	77
Narrow bridges, gangplanks, catwalks, narrow paths, etc.....	66	94
Negotiating a staircase having a small landing.....	63	87
Passing major obstacles.....	60	78
Passing minor obstacles.....	59	78
Surmounting obstacles over 5 feet high.....	61	80
Trenches, dugouts, and other excavations.....	64	94
Litter securing strap.....	74	100
Litter ski adapter.....	77	105
Litter squad.....	27	40
Loading casualties aboard aircraft:		
General.....	118	176
Loading plan.....	119	177
Steps in loading.....	120	179
Military Air Transport Service.....	116	174
Motor ambulance:		
Definition.....	85	112
Personnel and equipment.....	86	112
¾-ton, 4 x 4, M 43.....	87	112
Bus ambulance.....	87	112
Metropolitan.....	87	112
Instruction in loading and unloading.....	88-91	120
¾-ton, ambulance.....	90	121
1¼-ton, truck with litter bracket.....	91	134
Bus ambulance.....	92	140
Neck (fireman's drag).....	10	14
One-man carries:		
Arms carry.....	7	5
Back lift and carry.....	13	17
Fireman's carry.....	5	4
Neck (fireman's) drag.....	10	14
Pack-strap.....	9	5
Pistol-belt carry.....	11	15
Pistol-belt drag.....	12	17
Saddleback carry.....	8	5
Supporting carry.....	6	5
Pack-strap carry.....	9	5
Pistol-belt carry.....	11	15
Pistol-belt drag.....	12	17
Preparation of patients for air transport:		
Preparation of patient.....	109	159
Care of patients at remain overnight hospitals.....	112	161
Classification of patients for air transport.....	111	160
Criteria.....	110	160
Rail transportation.....	101-103	151

	<i>Paragraph</i>	<i>Page</i>
River crossings.....	127	189
Saddleback carry (one-man).....	8	5
Saddleback carry (two-man).....	17	20
Ships:		
Embarkation of casualties.....	126	187
Hospital.....	123	185
Transport.....	124	186
Snow boats (ahkio).....	77	105
Special manual evacuation techniques:		
Removal of casualties from tanks.....	20	30
Removal of casualties from trees.....	21	32
Supporting carry (one-man).....	6	5
Supporting carry (two-man).....	15	20
Tanks, removal of casualties.....	20	30
Trailer, ¼-ton, used for carrying litter casualties.....	94	144
Trains:		
Composition of nonstandard ambulance.....	103	155
Nonstandard ambulance.....	102	151
Standard ambulance.....	101	151
Transport ships.....	124	186
Transportation, as related to medical task.....	2	3
Travois.....	75	103
Trees, removal of casualties from.....	21	32
Toboggan litter adapter.....	77	105
Trucks:		
Ambulance, ¾-ton, 4 x 4 M43 loading and unloading....	87-90	112
Amphibian, 2½-ton, used for carrying litter casualties..	97	147
1½-ton, 6 x 6, used for carrying litter casualties.....	95	146
1¼-ton, 4 x 4, used for carrying litter casualties.....	87	112
¼-ton, 4 x 4, converted to ambulance loading and un-		
loading.....	87-91	112
¾-ton, 4 x 4, used for carrying litter casualties.....	95	146
2½-ton, 6 x 6, used for carrying litter casualties.....	96	147
Two-man carries:		
Arms carry.....	16	21
Four-hand carry.....	18	24
Two-hand carry.....	19	24
Removal of casualties from tanks.....	20	30
Removal of casualties from trees.....	21	32
Saddleback carry.....	17	23
U. S. Air Force Medical Units for Evacuation by Air.....	117	175
Water transportation.....	121-127	184
When employed.....	124	186

[AG 704.11 (9 Dec 54)]

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For explanation of abbreviations used, see SR 320-50-1.